CS INSTRUMENTS GmbH

Proven and innovative measuring technology for compressed air and gases

Catalogue for measuring professionals 2011/2012

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Extract from the customers list:

Confidence is good – **measuring** is better

Approven and innovative measuring technology of CS Instruments GmbH

Welcome to the new CS Instruments catalogue 2011/2012 drawn up for measuring professionals.

Increasing energy costs force many enterprises to use possible savings in case of different kinds of energy like compressed air, electrical energy, gas, cooling energy/ thermal energy, … For this purpose the consumptions and the costs within an enterprise have to be transparent.

CS Instruments GmbH accommodated this trend with its newly developed intelligent chart recorder DS 500. Up to 12 energy counters (current counters, heat meters, water meters, gas meters etc.) can be connected to DS 500 and evaluated automatically.

Daily, weekly or monthly reports give a quick survey on the consumption and the cost savings of saving measures which have been carried out.

Picture:
DS 500
(For details please see pages 4 to 11)

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DS 500

Intelligent chart recorder for compressed air and gases

Measurement - control - indication - alarm - recording - evaluation

Advantages at a glance:

- **Clear layout:** 7" colour screen with touch panel…
- **Versatile:** Up to 12 optional sensors can be connected…
- **Easy:** Very easy operation, automatic sensor identification…
- **Reliable:** Stores all measured values reliably, 4 alarm relays for threshold exceedings...
- **Suitable for industrial applications:** Metal housing IP 65 or panel mounting…
- **Data available though world wide web:** Network-compatible and remote transmission via webserver
- **Intelligent:** Daily/weekly monthly reports…
- **… Saves time and costs during installation**

DS 500 — the intelligent chart recorder of the next generation

For more than 20 years CS Instruments has been developing, manufacturing and marketing measuring instruments for compressed air and gases. Our long-term practical experience in measurement and control technology was implemented in the new DS 500.
From recording of the measured data, automatic sensor identification, indication on a big colour screen, alerting, storage up to remote read-out via webserver … this is all possible with DS 500. By means of the CS Soft software alarms can be sent via SMS or e-mail. On the big 7" colour screen with touch panel all information are available at a glance. The operation is very easy.
All measured values, measured curves and threshold exceedings are indicated. The curve progressions from the beginning of the measurement can be viewed by an easy slide of the finger.

Daily/weekly/monthly reports with costs in € and counter reading in m³ for each consumption sensor are completing the sophisticated system concept.

The big difference to ordinary paperless chart recorders reveals in the easy initiation and in the evaluation of the measured data. All sensors are identified directly and powered by DS 500. Everything is matched and tuned.

No time consuming studying of the instruction manual **… this saves time.**
Internal voltage supply of all sensors, no wiring of external mains units
… this saves additional costs.

Technical data DS 500

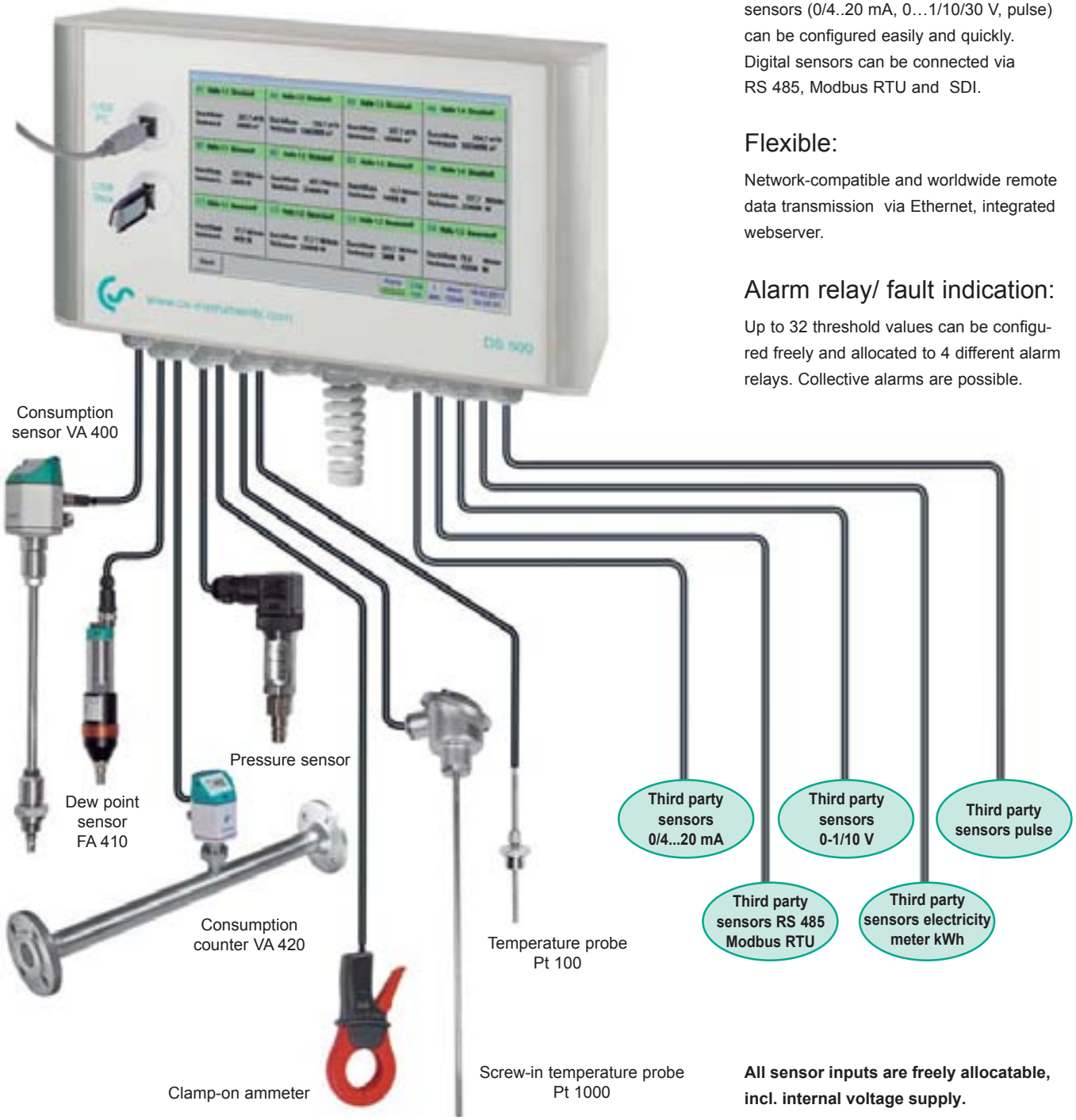
Dimensions of housing	280 x 170 x 90 mm, IP 65
Connections	18 x PG 12 for sensors and supply, alarm relays 1 x RJ 45 Ethernet connection
Version panel mounting	Cutout panel 250 x 156 mm
Weight	7.3 kg
Material	Die cast metal, front screen polyester
Sensor inputs	4/8/12 sensor inputs for analogue and digital sensors freely allocatable. See options Digital CS sensors for dew point and consumption with SDI interface FA/VA 400 Series, Digital third-party sensors RS 485 / Modbus RTU, other Bus systems realizable on request Analogue CS sensors for pressure, temperature, clamp-on ammeters preconfigured Analogue third-party sensors 0/4 ..20 mA, 0..1/10/30V, pulse, Pt 100 / Pt 1000, KTY
Power supply for sensors	24 VDC, max. 130 mA per sensor, integrated mains unit max. 24 VDC, 25 W in case of version 8/12 sensor inputs 2 integrated mains units each max.24 VDC, 25 Watt
Interfaces	USB stick, USB cable, Ethernet / RS 485 Modbus RTU / TCP, SDI other bus systems on request, WEB server optionally
Outputs	4 relays (changeover contact 230 VAC, 6 A), alarm management, relays freely programmable, collective alarm Analogue output, pulse in case of sensors with own signal output looped, like e. g. VA/FA Series
Memory card	Memory size 2 GB SD memory card standard, optionally up to 4 GB
Power supply	100...240 VAC / 50-60 Hz, special version 24 VDC
Colour screen	7" touch panel TFT transmissive, graphics, curves, statistics
Accuracy	see sensor specifications
Operating temperature	0...50°C
Storage temperature	-20...70°C
Optionally	Web server
Optionally	Quick measurement with 10 ms sampling rate for analogue sensors, Max/Min indication per second
Optionally	Option "consumption report" statistics, daily/weekly/monthly report

Description Order	no.
DS 500 - intelligent chart recorder in basic version (4 sensor inputs)	0500 5000
Option 4 additional sensor inputs for DS 500	Z500 5001
Option 8 additional sensor inputs for DS 500	Z500 5002
Option Integrated webserver	Z500.5003
Option "consumption report" statistics, daily/weekly/monthly report	Z500.5004
Option "quick measurement with 10 msec sampling rate" for analogue sensors	Z500.5005
Option version for panel mounting	Z500.5006
Option power supply 24VDC (instead of 100...240 VAC)	Z500.5007
CS Soft Basic for DS 500 - data evaluation in graphic and table form, reading out of the measured data of one DS 500 via USB or Ethernet	0554.7040
CS Soft Network - Database Client/Server Solution (up to 5 DS 500) - database (MySQL) to Server - data evaluation via Client-Software	0554.7041
CS Soft Network - Database Client/Server Solution (up to 10 DS 500) - database (MySQL) to Server - data evaluation via Client-Software	0554.7042
CS Soft Network - Database Client/Server Solution (up to 20 DS 500) - database (MySQL) to Server - data evaluation via Client-Software	0554.7043
CS Soft Network - Database Client/Server Solution (> 20 DS 500) - database (MySQL) to Server - data evaluation via Client-Software	0554.7044

Input signals	
Current signal	(0...20mA/4...20mA)
internal or external power supply	
Measuring range	0…20 mA
Resolution	0.0001 mA
Accuracy	± 0.003 mA ± 0.05 %
Input resistance	50 Ω
Voltage signal	(0...1 V)
Measuring range	0…1 V
Resolution	0.05 mV
Accuracy	± 0.2 mV ± 0.05 %
Input resistance	100 kΩ
Voltage signal	(0...10 V / 30 V)
Measuring range	0…10 V
Resolution	0.5 mV
Accuracy	± 2 mV ± 0.05 %
Input resistance	1 MΩ
RTD Pt 100	
Measuring range	-200…850° C
Resolution	0.1° C
Accuracy	± 0.2°C (-100...400°C) ± 0.3°C (further range)
RTD Pt 1000	
Measuring range	-200…850° C
Resolution	0.1° C
Accuracy	± 0.2° (-100...400°C)
Pulse	
Measuring range	min pulse length 100 µs frequency 0...1 kHz max. 30 VDC

DS 500

Intelligent chart recorder for compressed air and gases


Consumption sensor VA 400
Pressure sensor
Dew point sensor FA 410
Consumption counter VA 420
Temperature probe Pt 100
Clamp-on ammeter
Screw-in temperature probe Pt 1000
Third party sensors 0/4...20 mA
Third party sensors 0-1/10 V
Third party sensors pulse
Third party sensors RS 485 Modbus RTU
Third party sensors electricity meter kWh

Versatile:

Up to 12 sensors, incl. all CS sensors (consumption, dew point, pressure, current, KTY, PT 100, PT 1000) are identified automatically by DS 500. Optional analogue sensors (0/4..20 mA, 0…1/10/30 V, pulse) can be configured easily and quickly. Digital sensors can be connected via RS 485, Modbus RTU and SDI.

Flexible:

Network-compatible and worldwide remote data transmission via Ethernet, integrated webserver.

Alarm relay/ fault indication:

Up to 32 threshold values can be configured freely and allocated to 4 different alarm relays. Collective alarms are possible.

All sensor inputs are freely allocatable, incl. internal voltage supply.

Consumption Leakage Dew point Pressure Current Temperature

MULTIFUNCTION

Suitable **probes** from the **CS Instruments** product range

Consumption sensors VA 400:	**Order no.**
VA 400 consumption sensor in basic version: Standard (92.7 m/s), sensor length 220 mm, without display	0695 4001
Option for VA 400:	
Max. version (185 m/s)	Z695 4003
HighSpeed version (224 m/s)	Z695 4002
Sensor length 120 mm	ZSL 0120
Sensor length 160 mm	ZSL 0160
Sensor length 300 mm	ZSL 0300
Sensor length 400 mm	ZSL 0400
Consumption counters VA 420:	
Consumption counter VA 420 with integrated measuring section (R 1/4" DN 8)	0695 0420
Consumption counter VA 420 with integrated measuring section (R 1/2 DN 15)	0695 0421
Consumption counter VA 420 with integrated measuring section (R 3/4" DN 20)	0695 0422
Consumption counter VA 420 with integrated measuring section (R 1" DN 25)	0695 0423
Consumption counter VA 420 with integrated measuring section (R 1 1/4" DN 32)	0695 0426
Consumption counter VA 420 with integrated measuring section (R 1 1/2" DN 40)	0695 0424
Consumption counter VA 420 with integrated measuring section (R 2" DN 50)	0695 0425
Dew point sensors:	
FA 410 dew point sensor, -80°...20°Ctd incl. inspection certificate	0699 0410
FA 415 dew point sensor, -20°...50°Ctd incl. inspection certificate	0699 0415
Standard measuring chamber for compressed air up to 16 bar	0699 3390
Connection cables for VA 400, VA 420, FA 410 and FA 415:	
Connection cables for consumption sensors / dew point sensors:	
Connection cable 5 m	0553 0104
Connection cable 10 m	0553 0105
Pressure sensors:	
Standard pressure sensor CS 16, 0...16 bar, ± 1 % accuracy of full scale	0694 1886
Standard pressure sensor CS 40, 0...40 bar, ± 1 % accuracy of full scale	0694 0356
Standard pressure sensor CS 1,6 absolute, 0...1,6 bar abs., ± 1 % accuracy of full scale	0694 3551
Standard pressure sensor CS 100, 0...100 bar, ± 1 % accuracy of full scale	0694 3557
Standard pressure sensor CS 250, 0...250 bar, ± 1 % accuracy of full scale	0694 3558
Standard pressure sensor CS 400, 0...400 bar, ± 1 % accuracy of full scale	0694 3559
Precision pressure sensor CS, -1...+15 bar, ± 0.5 % accuracy of full scale	0694 3553
Temperature probes:	
Screw-in temperature probe Pt 100, class A, length 300 mm, Ø 6 mm, with measuring transducer 4...20 mA = -50...+500°C (2-wire-technology)	0693 0002
Temperature probe cable Pt 100, Class A, length 300 mm, Ø 6 mm, -50...+180°C, 5 m probe connection cable with open ends	0604 0102
Temperature probe cable Pt 100, Class A, length 150 mm, Ø 6 mm,, -50...+180°C, 5 m probe connection cable with open ends	0604 0100
Clamp screwing 6 mm, G1/2", VA clamping, pressure-tight up to 10 bar	0554 6004
Connection cables for pressure sensors / temperature probes:	
Connection cable 5 m	0553 0108
Connection cable 10 m	0553 0109
Clamp-on ammeters:	
Clamp-on ammeter 0...1000 A TRMS incl. 5 m connection cable with open ends	0554 0507

Consumption

Consumption

Dew point

Pressure

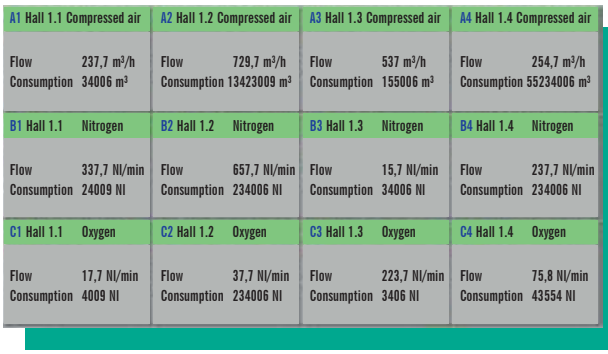
Temperature

Current

Optional third-party sensors 0/4...20 mA, 0...1/10/30 V, PT 100 / PT 1000, KTY, pulse, RS 485 Modbus connectable.

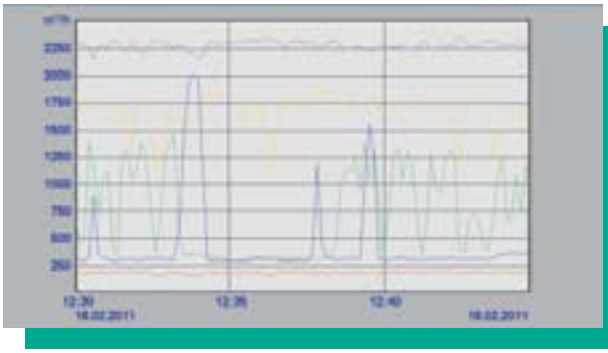
All important information at a glance:

Measured values, statistics, curves with the 7 inch colour screen touch panel



Real time measured values

All measured values can be seen at a glance. Threshold exceedings are indicated in red colour. A "measuring site name" can be allocated to each sensor.

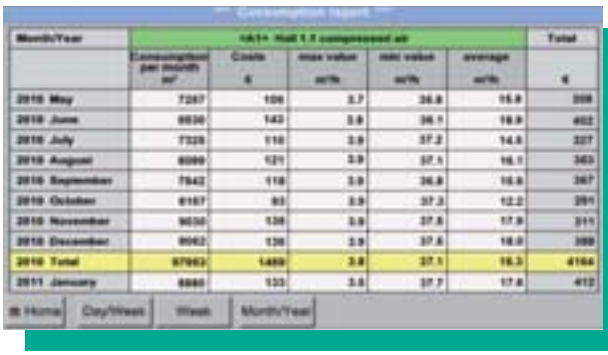


Graphic display

This display replaces the former evaluation of ordinary paper chart recorders and offers lots of advantages. The time axis can be moved by a finger slide. The "zoom function by finger movement" which enables an analysis of peak values is unique.

Real time measured values and graph

Additionally to the measurement curves the real time value is indicated as well.



Statistics and reports

Different to ordinary chart recorders the DS 500 offers not only the recording of the measured data but also the evaluation of all consumption sensors optionally as daily/weekly/monthly report at the push of a button. It is no longer necessary to read-out the counter and transfer the values manually into a list. The reports can be imported to every PC into Excel® by means of a USB stick and after that they can be printed out without any additional software. This saves time and money and simplifies the evaluation enoumously.

Flexible data transfer for each application

1. Data transfer via USB stick or USB cable

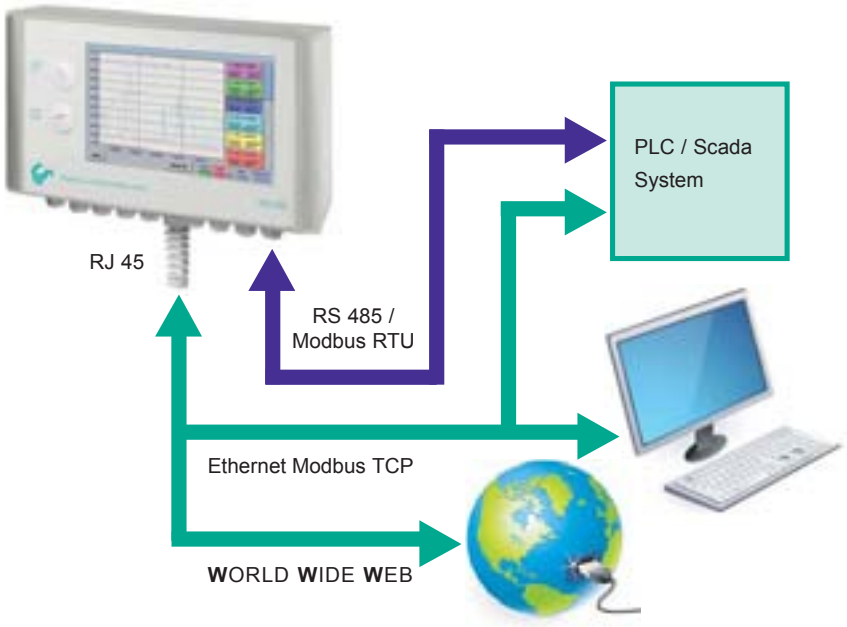
If no Ethernet-/Bus connection is existing or if the installation would be too costly the recorded data can be stored onto a USB stick and transferred to the PC. DS 500 will automatically identify the USB stick. The user will be guided through the menu "Read-out data".The data stored in the USB stick can be comfortably evaluated at the PC by means of the **CS Soft Basic.**

CS Soft Basic

2. Data transfer, remote maintenance and consumption analysis via webserver and integrated Ethernet interface, Modbus, RS 485…

The current measured data and the stored measured data can be transferred via Ethernet or RS 485 (Modbus).

The integrated webserver enables the user to read out the measured data via internet. For the evaluation of the data at the PC the user can dispose of the comfortable and versatile CS Soft Basic, which leaves nothing to be desired. Threshold exceedings can be sent via SMS and e-mail.



DS 500 can be connected via Ethernet/ RS 485 to customers' own systems (PLC, Scada).

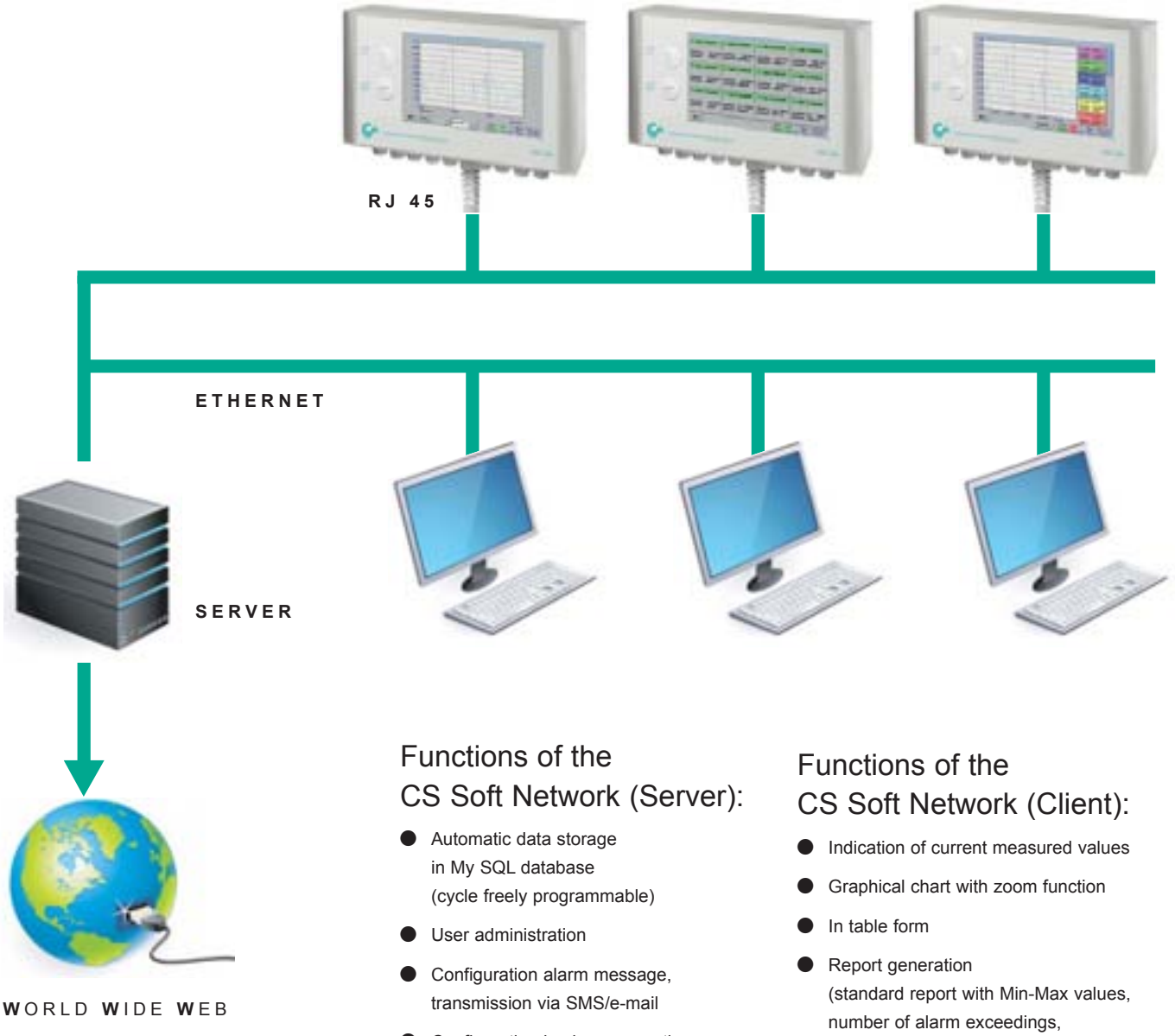
By means of the CS Soft Basic the data can be evaluated comfortably.

As an alternative the web server in DS 500 can be addressed via any web browser. Current measured values and consumption statistics can be transferred via the web server.

Transparent measurement data any time at any PC

CS Soft Network Database Client / Server Solution

By means of the CS Soft Network Database Client / Server Solution an optional number of DS 500 /DS 300 instruments can be evaluated via Ethernet. The software stores the measured data of all DS 500 / DS 300 cyclically (cycle freely adjustable) in a SQL database on the server. In case of an exceeding of the stored alarm values the software automatically sends an SMS or an e-mail. Furthermore, different user levels can be defined in the server software so that single staff members only can access the measured data of certain DS 500 / DS 300.
The evalulation of the measured data can be carried out by means of the client software from each PC within the company.



Functions of the CS Soft Network (Server):

- Automatic data storage in My SQL database (cycle freely programmable)
- User administration
- Configuration alarm message, transmission via SMS/e-mail
- Configuration backup generation

Functions of the CS Soft Network (Client):

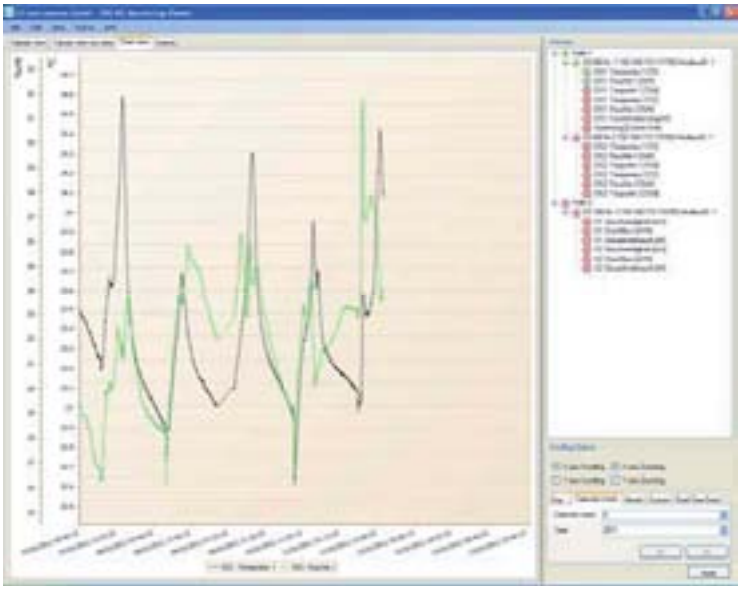
- Indication of current measured values
- Graphical chart with zoom function
- In table form
- Report generation (standard report with Min-Max values, number of alarm exceedings, moment of alarm exceeding)
- Automatic consumption report

View:
Current measurement values

- Load background image
- Place/fix window with measurement values
- Red measurement values in case of alarm exceeding

Graphical chart
with zoom function

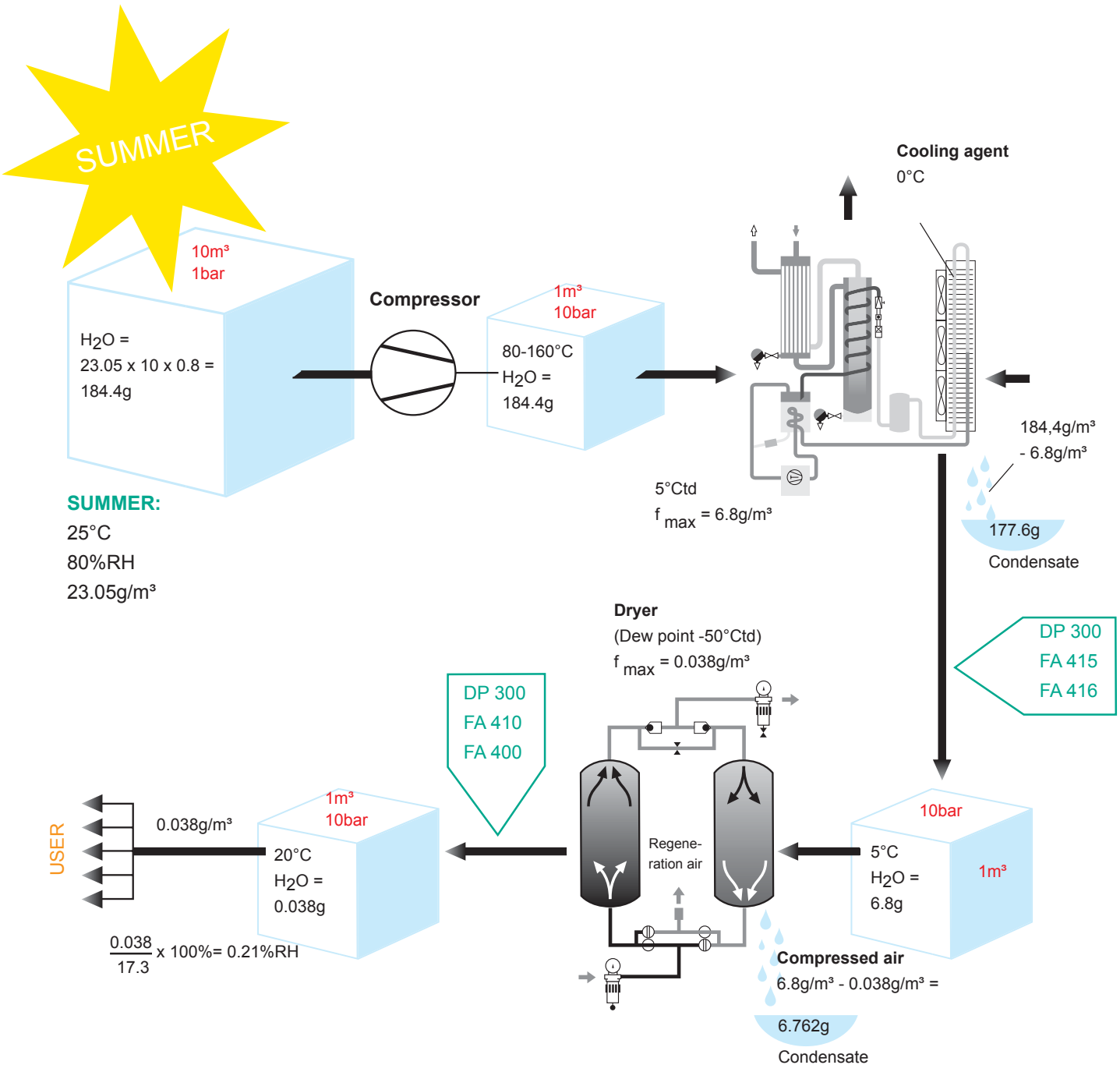
- Selection of the measuring channels to be indicated
- Easy zoom in and zoom out
- Up to 8 y-axis
- Quick access to day, week, month view



			Unit		Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10	Aug 10	Sep 10	Oct 10	Nov 10	Dec 10	Sum 2010
Hall 1	DS 500	Channel A1	m³	Counter beginning	9.560	18.440	26.550	34.502	43.201	50.458	59.988	67.313	75.412	83.254	89.421	98.451	
		Machine 1	m³	Counter end	18.440	26.550	34.502	43.201	50.458	59.988	67.313	75.412	83.254	89.421	98.451	107.513	
			m³	Monthly consumption	8.880	8.110	7.952	8.699	7.257	9.530	7.325	8.099	7.842	6.167	9.030	9.062	97.953
			m³/h	Average consumption	17,6	16,1	15,8	17,3	15,8	18,9	14,5	16,1	15,6	12,2	17,9	18,0	16,2
			m³/h	Min. value	3,5	3,5	3,7	3,7	3,7	3,8	3,9	3,9	3,9	3,9	3,9	3,9	
			m³/h	Max. value	37,7	38,0	38,5	35,1	35,8	36,1	37,2	37,1	36,8	37,3	37,5	37,5	
			€	Costs	133	122	119	130	109	143	110	121	118	93	135	136	1.469 €
		Channel A2	m³	Counter beginning	24.750	57.002	87.541	113.245	113.245	138.451	167.865	195.354	219.874	248.798	279.477	312.313	
		Machine 2	m³	Counter end	57.002	87.541	113.245	113.245	138.451	167.865	195.354	219.874	248.798	279.477	312.313	345.554	
			m³	Monthly consumption	32.252	30.539	25.704	0	25.206	29.414	27.489	24.520	28.924	30.679	32.836	33.241	320.804
			m³/h	Average consumption	64,0	60,6	51,0	0,0	50,0	58,4	54,5	48,7	57,4	60,9	65,2	66,0	
			m³/h	Min. value	11,4	11,5	11,5	0,0	11,6	11,7	14,7	14,7	14,8	14,8	14,8	14,8	
			m³/h	Max. value	97,4	94,2	95,5	94,5	94,2	95,6	95,6	95,8	100,7	97,4	95,2	96,2	
			€	Costs	484	458	386	0	378	441	412	368	434	460	493	499	4.812 €
Sum Hall 1			m³	Monthly consumption	41.132	38.649	33.656	8.699	32.463	38.944	34.814	32.619	36.766	36.846	41.866	42.303	418.757
			€ Costs		617	580	505	130	487	584	522	489	551	553	628	635	6.281
			m³/h	Average consumption	81,6	76,6	66,8	17,3	64,4	77,3	69,1	64,7	72,9	73,1	83,1	83,9	

Consumption analysis (in connection with option "consumption report")

Typical procedure of **compressed air** drying with dew point **measurement**



Portable dew point meter **DP 300**

Relative humidity, temperature and dew point measurement with one instrument

The portable dew point meter DP 300 is the ideal instrument for service and is supplied in a convenient case.
Thanks to the internal rechargeable battery it measures quickly and reliably for a duration of up to 15 hours.

Special feature

- Large measuring range to -80 °C_{td} for all dryers (adsorption, membrane, refrigeration dryers)

Description	Order no.
Set DP 300 consisting of:	**0600 6000**
Portable dew point meter DP300 up to 50 bar incl. rechargeable battery	0560 6000
Mobile measuring chamber up to 16 bar	0699 4490
Diffusion-tight teflon hose 1 m with fast coupling at both ends	0554 0003
Power supply 24 VDC, 230 VAC for rech. battery load and long-term meas.	0554 0001
Control and calibration set 11.3 % RH	0554 0002
Quick-lock coupling	0530 1101
Dry container for DP 300	0699 2500
Transport case	0554 6002
Additional accessories, not included in the set:	
Portable dew point meter DP 300 up to 350 bar including rech. battery	0560 6001
High-pressure measuring chamber up to 350 bar	0699 3590
Precision calibration at -40 °Ctd with ISO certificate	0699 3396
Measuring chamber for atmospheric dew point	0699 3690
Measuring chamber for granulate dryers for minimum over pressure	0699 3490
Measuring chamber for respiratory air bottles up to 350 bar	0699 3790
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Technical data DP 300	
Display single line:	dew point (°C_{td} resp. °F) relative humidity (% RH) temperature (°C resp. °F) freely selectable
Display functions:	Max, Min, state of battery
Measuring range:	-80...50 °C_{td} -20...70 °C 0 to 100 % RH
Pressure range:	-1 to 50 bar standard -1 to 350 bar high-pressure version
PC connection:	SDI interface
Accuracy:	± 0,5 °C_{td} at -10...50 °C_{td} typical ± 2 °C_{td} at -40 °C_{td}
Power supply:	internal rech. batteries (4 x 1,5 NiMh AAA) for approx. 15 h continuous operation
Operating temp:	-20...70 °C
EMC:	DIN EN 61326
Screw-in thread:	G 1/2" stainless steel
Housing:	polycarbonate

FA 410 from -80 to 20 °C_{td}

FA 410 – the ideal dew point sensor for monitoring membrane and adsorption dryers

Typical use in compressed air dryers/granulate dryers at very low dew points down to -80 °C.

Recommendation:

Mounting with standard measuring chamber for compressed air up to 16 bar
Advantage: Easy installation via fast coupling.

Special features

- Measuring range -80...20 °C_{td}
- Extremely long-term stable
- Analogue output 4...20 mA
- Condensation insensitive
- Quick response time
- Pressure-tight up to 350 bar (special version)

Technical data FA 410

Measuring range:	-80...20 °C_{td} resp. -20...50 °C_{td}
Accuracy:	± 1 °C at 20...-20 °C_{td} ± 2 °C at -20...-50 °C_{td} ± 3 °C at -50...-80 °C_{td}
Pressure range:	-1...50 bar special version up to 350 bar
Power supply:	24 VDC (16...30 VDC)
Protection class:	IP 65
EMC:	according to DIN EN 61326
Operating temp:	-20...70 °C
Connection:	M12, 5-pole
PC connection:	SDI interface
Analogue output:	4...20 mA = -80...20 °C_{td} resp. 4...20 mA = -20...50 °C_{td}
Burden for analogue output:	< 500 Ohm
Screw-in thread:	G1/2"
Dimensions:	Ø 30 mm, length approx. 130 mm
Via service software:	
– choose units:	% RH, °Ctd, g/m³, mg/m³, ppm V/V
– scaling	change 4...20 mA
Special version:	4...20mA, 2-wire technology

Description	Order no..
FA 410 dew point sensor, -80°...20°Ctd incl. inspection certificate	0699 0410
FA 410 dew point sensor, -20°...50°Ctd incl. inspection certificate	0699 0412
Connection cables:	
Connection cable, length: 5 m	0553 0104
Connection cable, length: 10 m	0553 0105
Options for FA 410:	
Option special version up to 350 bar	0699 4003
Option output in mg/m³, g/kg, oder %RH, special scaling 4...20 mA	0699 4004
Additional accessories:	
Standard measuring chamber up to 16 bar	0699 3390
High-pressure measuring chamber up to 350 bar	0699 3590
Measuring chamber for respiratory air bottles up to 350 bar	0699 3790
CS Service Software for FA/VA 400 sensors including PC connection set, USB adapter and interface adapter to the sensor as well as CSM-S for data recording, please see page 21	0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24 VDC, 0.35 A	0554 0108
Mains unit on DIN rail 100-240 VAC / 24 VDC, 0.35 A	0699 3340
Calibration:	
Precision calibration at -40 °Ctd including ISO certificate	0699 3396
Precision calibration at 3 °Ctd including ISO certificate	3200 0003
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Dew point set DS 52 for adsorption dryers

Dew point set DS 52

consisting of:

• Digital process meter DS 52

• Dew point sensor FA 410

• Standard measuring chamber

Option alarm unit (buzzer and continuous red light):

The measuring range of -80...20 °Ctd makes the dew point set DS 52 with alarm the ideal dew point monitor with analogue output 4...20 mA.

The dew point sensor FA 410 is extremely long-term stable and can be installed and removed quickly and easily under pressure by means of the screwable measuring chamber including quick-coupling. The dew point set is supplied ready for plug-in, i. e. everything is completely wired. The alarm values can be freely adjusted.

Special features

- System ready for plug-in: Everything completely wired
- No time-consuming studying of the instruction manual
- 2 alarm contacts (230 VAC, 3 A) pre- and main alarm freely adjustable
- 4...20 mA analogue output
- Option alarm unit: Buzzer and continuous red light

Description	Order no.
Dew point set DS 52 for adsorption dryers consisting of:	**0600 0420**
DS 52 LED digital process meter in wall housing	0500 0007
FA 410 dew point sensor (-80...20 °Ctd)	0699 0410
Standard measuring chamber up to 16 bar	0699 3390
Connection cable for VA/FA Series, 5 m with M12 plug	0553 0104
Options:	
Power supply 24 VDC (instead of 230 VAC)	Z500 0001
Power supply 110 VAC (instead of 230 VAC)	Z500 0002
Alarm unit mounted at wall housing	Z500 0003
Alarm unit for external mounting with 5 m cable	Z500 0004
Additional accessory:	
Precision calibration at -40 °Ctd including ISO certificate	0699 3396

Technical data display DS 52

Dimensions:	118 x 92 x 93 mm
Display:	LED red, 7 segments, height: 13 mm, 5 digits, 2 LED for alarm relay
Keypad:	4 keys
Input:	dew point sensor FA 410
Power supply:	230 VAC, 50/60 Hz; Option: 24 VDC or 110 VAC 50/60 Hz
Alarm outputs:	2 x relay output, changeover contact, 250 VAC, max. 3 A
Operating temperature:	-10...+60 °C (storage temp. -20 °C...+80 °C)
Alarm thresholds:	freely adjustable
Hysteresis:	2 °Ctd
Analogue output:	4...20 mA = -80...20 °Ctd

Technical data dew point sensor FA 410

Measuring range:	-80...20 °Ctd
Accuracy:	± 1 °C at 20...-20 °Ctd ± 2 °C at -20...50 °Ctd ± 3 °C at -50...-80 °Ctd
Pressure range:	-1...50 bar (with meas. chamber 16 bar), special version up to 350 bar
Protection class:	IP 65
EMV:	according to DIN EN 61326
Operating temp.:	-20...70 °C
Burden analogue output:	< 500 Ohm
Screw-in thread:	G 1/2" without meas. chamber

FA 415 / FA 416 from -20 to 50 °C$_{td}$

The dew point sensors FA 415/416
for the typical use in refrigeration dryers

FA 415 dew point sensor

The ideal dew point sensor for the monitoring of refrigeration dryers with analogue output 4...20 mA

Special features

- Analogue output 4...20 mA
- Precise, long-term stability
- Quick response time
- Measuring range -20...50 °C$_{td}$

FA 416 condensate switch

For reliable alarm signal in case of condensation with alarm relay and LED

Special features

- Dew point distance freely adjustable
- Alarm in case of condensation
- LED alarm signal
- Quick response time

Technical data FA 415/416

Measuring range:	-20...50 °C$_{td}$ resp. 0...100 % RH
Accuracy:	± 1 °C at 0...20 °C$_{td}$ ± 2 °C remaining range
Pressure range:	-1...16 bar
Power supply:	24 VDC (10...30 VDC)
Protection class:	IP 65
EMC:	according to DIN EN 61326
Operating temp.:	-20...70 °C
Connection:	M12, 5-pole
PC connection:	SDI interface
Screw-in thread:	G1/2"
Dimensions:	Ø 30 mm, length 130 mm
Output FA 415:	4...20 mA = -20...50 °C$_{td}$
Burden for analogue output:	< 500 Ohm
Output FA 416:	Relay NO max. 60 VDC, 0,5 A, ex factory 12 °C$_{td}$ resp. in case of condensation, dew point distance freely adjustable

Recommendation:

Mounting with standard meas. chamber for compressed air up to 16 bar
Advantage: Easy installation via fast coupling.

Description	Order no.
FA 415 dew point sensor	0699 0415
FA 416 condensate switch	0699 0416
Connection cables:	
Connection cable, length: 5m	0553 0104
Connection cable, length: 10m	0553 0105
Additional accessories:	
Standard measuring chamber up to 16 bar	0699 3390
CS Service Software for FA/VA 400 sensors including PC connection set, USB adapter and interface adapter to the sensor as well as CSM-S for data recording, see page 21	0554 2005
Mains unit in wall housin 100-240 V, 10 VA, 50-60 Hz/24 VDC, 0.35 A	0554 0108
Mains unit on DIN rail 100-240 VAC / 24 VDC, 0.35 A	0699 3340
Calibration:	
Precision calibration at 3° Ctd including ISO certificate	3200 0003
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Dew point set DS 52 for refrigeration dryers

Dew point set DS 52
consisting of:

• Digital process meter DS 52

• Dew point sensor FA 415

• Standard measuring chamber

Option: Alarm unit (buzzer and continuous red light)

Special features

- System ready for plug-in
  Everything completely wired
- No time-consuming studying of the instruction manual
- 2 alarm contacts (230 VAC, 3 A)
  pre- and main-alarm freely adjustable
- 4...20 mA analogue output
- Option alarm unit:
  Buzzer and continuous red light

The measuring range of -20...50 °Ctd makes the dew point set DS 52 with alarm the ideal dew point monitor with analogue output 4...20 mA.

The dew point sensor FA 415 is extremely long-term stable and can be installed and removed quickly and easily under pressure by means of the screwable measuring chamber including quick coupling. The dew point set is supplied ready for plug-in, i. e. everything is completely wired. The alarm values can be freely adjusted.

Description	Order no.
Dew point set DS 52 for refrigeration dryers, consisting of:	**0600 0425**
DS 52 LED digital process meter in wall housing	0500 0007
FA 415 dew point sensor (-20...50 °Ctd)	0699 0415
Standard measuring chamber up to 16 bar	0699 3390
Connection cable for VA/FA Series, 5 m with M12 plug	0553 0104
Options:	
Power supply 24 VDC (instead of 230 VAC)	Z500 0001
Power uspply 110 VAC (instead of 230 VAC)	Z500 0002
Alarm unit mounted at wall housing	Z500 0003
Alarm unit for external mounting with 5 m lead	Z500 0004
Additional accessory:	
Precision calibration at 3°Ctd including ISO certificate	3200 0003

Technical data display DS 52

Dimensions:	118 x 92 x 93 mm
Display:	LED red, 7 segments, height: 13 mm, 5 digits, 2 LED for alarm relay
Keypad:	4 keys
Input:	dew point sensor FA 415
Power supply:	230 VAC, 50/60 Hz; Option: 24 VDC or 110 VAC 50/60 Hz
Alarm outputs:	2 x relay output, changeover contact, 250 VAC, max. 3 A
Operating temperature:	-10...+60 °C (storage temp. -20 °C...+80 °C)
Alarm thresholds:	freely adjustable
Hysteresis:	2 °Ctd
Analogue output:	4...20 mA = -20...50 °Ctd

Technical data dew point sensor FA 415

Measuring range:	-20...50 °Ctd
Accuracy:	± 1 °C at 0...20 °Ctd ± 2 °C remaining range
Pressure range:	-1...16 bar
Protection class:	IP 65
EMV:	according to DIN EN 61326
Operating temp.:	-20...70 °C
Connection:	M12, 5 pole
PC connection:	SDI interface
Burden analogue output:	< 500 Ohm
Screw-in thread:	G 1/2" without meas.chamber

Dew point set **FA 410**

Ready for upgrading with data logger, ethernet interface and 2nd sensor input

Dew point set FA 410

consisting of:

Option: Alarm unit (buzzer and continuous red light)

• Standard measuring chamber

• Multifunction measuring instrument DS 300

• 2nd sensor input for dew point or consumption sensors VA 400/420

• Optional: Ethernet interface

• Dew point sensor FA 410

Description	Order no.
Dew point set FA 410 for adsorption dryers (-80...20 °Ctd)	0600 0410
Dew point set FA 410 for refrigeration dryers (-20...50 °Ctd)	0600 0412
Option:	
Integrated data logger for 1 million measured values	Z500 3001
Ethernet interface	Z500 3005
Alarm unit mounted at wall housing	Z500 0003
Alarm unit for external mounting with 5 m cable	Z500 0004
Additional accessories:	
CSM-S for data evaluation in graphic and table form including USB interface	0554 7011
Precision calibration at -40 °Ctd including ISO certificate	0699 3396
Precision calibration at 3 °Ctd including ISO certificate	3200 0003
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Special features

- System ready for plug-in: everything completely wired
- No time-consuming studying of the instruction manual
- 2 alarm contacts (230 VAC, 3 A) pre- and main-alarm freely adjustable
- 4...20 mA analogue output
- Optical alarm: Red flashing
- Parallel indication % RH, °C, $°C_{td}$

Option: Integrated data logger

- Recording of dew point progression of up to 1 million measured values
- CSM-S for evaluation in graphic and table form including USB interface. Read-out of the data optionally by USB or ethernet.

Technical data DS 300

Dimensions:	118 x 115 x 93 mm, IP 65 (wall housing) 92 x 92 x 70 mm, IP 65 (panel mounting)
Inputs:	2 digital inputs for FA 410 resp. VA 400
Interface:	USB
Keypad:	4 keys
Power supply:	100...240 VAC, 50-60 Hz
Acccuracy:	see FA 410 page 6
Alarm outputs:	2 relays, 230 VAC, 3 A
Operating temp.:	0...50 °C
Transport temperature:	-20...70 °C
OPTIONS	
Data logger:	1 million meas. values start/stop time, meas. rate freely adjustable

FA 400 from -80 to 20 °C_{td}

FA 400 is the ideal dew point measuring instrument with integrated display and alarm relay for refrigeration, membrane and adsorption dryers

It replaces the worldwide proven instrument FA 200.
The threshold value can be easily adjusted via the keypad.

Alarm adjustable via keypad

Special features

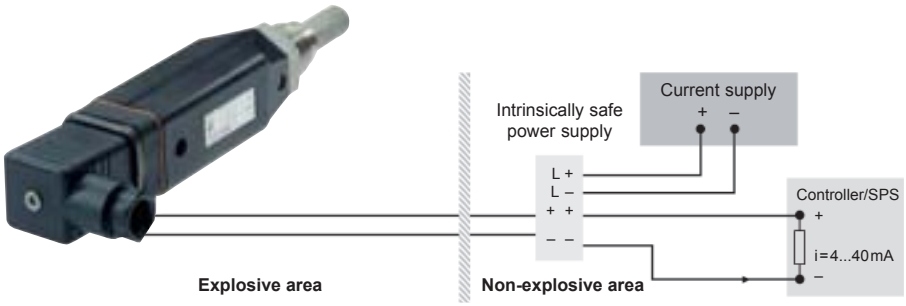
- -80...20 °C_{td}
- Integrated display
- Threshold value adjustable via keypad alarm relay (max. 60 VDC, 0.5 A)
- Pressure-tight up to 350 bar (special version)
- Extreme long-term stability
- Quick response time
- 4...20 mA analogue output
- 2 versions: Refrigeration dryers and adsorption dryers

Description	Order no.
FA 400 dew point sensor for refrigeration dryers, -20...50 °Ctd	0699 0401
FA 400 dew point sensor for adsorption dryers, -80...20 °Ctd	0699 0402
FA 400 dew point sensor, replacement of FA 200, -60...30 °Ctd	0699 0403
Connection cables:	
Connection cable, length: 5m (power supply and analogue output)	0553 0104
Connection cable, length 10m (power supply and analogue output)	0553 0105
Alarm cable, length: 5m	0553 0106
Alarm cable, length: 10m	0553 0107
Options for FA 400:	
Special version FA 400 up to 350 bar	0699 4003
Special scaling, output in ppm V/V, % RH, mg/m³	0699 4004
Additional accessories:	
Standard measuring chamber up to 16 bar	0699 3390
CS Service Software for FA/VA 400 sensors including PC connection set, USB adapter and interface adapter to the sensor as well as CSM-S for data recording, see page 21	0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24 VDC, 0.35 A	0554 0108
Power supply 100-240 VAC/24 VDC, 0.35 A for FA/VA 400 Series, 2 m cable	0554 0107
Calibration:	
Precision calibration at -40 °Ctd including ISO certificate	0699 3396
Precision calibration at 3 °Ctd including ISO certificate	3200 0003
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Technical data FA 400

Measuring range:	-80...20 °C_{td}, -60...30 °C_{td}, -20...50 °C_{td} resp. 0...100 % RH
Accuracy:	± 1 °C at 20...-20 °C_{td} ± 2 °C at -20...-50 °C_{td} ± 3 °C at -50...-80 °C_{td}
Pressure range:	-1...50 bar special version up to 350 bar
Power supply:	24 VDC (16...30 VDC) smoothed
Protection class:	IP 65
EMV:	according to DIN EN 61326
Operating temp.:	-20...50 °C
Connection:	2 x M12, 5-pole for analogue output and alarm output
PC connection:	SDI interface
Output:	4...20 mA = -80...20 °C_{td} 4...20 mA = -60...30 °C_{td} 4...20 mA = -20...50 °C_{td}
Burden for analogue output:	< 500 Ohm
Alarm relay:	NO, max. 60 VDC, 0.5 A
Screw-in thread:	G1/2"
Dimensions:	Ø 65 mm, length 160 mm
Output signals via software:	% RH, °C_{td}, g/m³, mg/m³, ppm V/V

FA 300 Ex -80 to 20 °C_{td}



Special features

- Robust design
- Pressure-tight up to 300 bar
- Long-term stable humidity sensor, approved for years
- 4...20 mA analogue output in 2-wire system
- Further parameters adjustable via software: % RH, g/m³, mg/m³, ppm V/V, g/kg
- CS Service Software for data storage and calibration (no approval for explosive areas)

Technical data FA 300-2 Ex	
Measuring range:	Pressure dew point in °C_{td}
FA 300-2 Ex:	-80...20 °C_{td} = 4...20 mA
Pressure range:	-1...300 bar
Power supply:	24 VDC (10...30 VDC)
Accuracy:	± 0,5 °C at -10...50 °C_{td} typical ± 2 °C at -40 °C_{td}
Output:	4...20 mA in 2-wire technology
Protection class:	IP 65
EMC:	according to DIN EN 61326
Operating temp.:	-20...70 °C
Storage temp.:	-40...80 °C
Burden for analogue output:	< 500 Ohm
Screw-in thread:	G1/2" stainless steel
Housing material:	polycarbonate
Sensor protection:	Sintered filter 50 µm stainless steel

FA 300-2 Ex measures the dew point resp. the pressure dew point in explosive areas of Zone 1.
Protection class: FA 300-2 Ex:
I 2G Ex ia II C T4

With the Atex approval for Zone 1 the established dew point measuring instruments FA 300-2 can now be used in explosive areas of the industry as well.
FA 300-2 Ex may only be used in connection with approved Ex-rated power supplies or safety barriers or galvanic separating elements
with max.: U0 = 30 V max.
I0 = 100 mA max.
P0 = 1 W max.

Description	Order no.
FA 300-2 Ex pressure dew point meter	0699 3070
Measuring chamber up to 350 bar	0699 3590
Special scaling Analogue output to other humidity parameters: % RH g/m³, mg/m³, ppm V/V, g/kg	0699 4004
Intrinsically safe power supply, safety barriers	0554 3071

Mains units

Mains unit in wall housing ▶

Mains unit in wall housing ▲

Mains unit on DIN rail ▶

Power supply ▲

Mains unit in wall housing:

Special features:

- Detachable screwing clamps for easy wiring
- Galvanic separation of the pulse output of consumption sensors VA 400/410
- 2 relay outputs (230 VAC, 3 A) for alarm signal amplification at dew point sensors FA 400, FA 416
- Live parts protected untouchably in housing

Description	Order no.
Mains unit in wall housing for sensors of the Series VA/FA, 100-240 V, 10 VA, 50-60 Hz / 24 VDC, 0.35 A	0554 0108
Mains unit on DIN rail, 100-240 VAC / 24 VDC, 0.35 A	0699 3340
Power supply 100-240 VAC/24 VDC, 0.35 A for Series VA/FA 400, 2 m cable	0554 0107

Technical data for mains unit in wall housing	
Dimensions:	118 x 133 x 92 mm (WxHxD)
Power supply:	100-240 VAC, 10 VA, 50-60 Hz
Output:	24 VDC, 0.35 A
Relay:	2 pieces, change-over contacts, 230 VAC, 3 A

Accessories for **dew point measurement** and **calibration**

CS Service Software

for FA/VA 400 sensors including PC connection set, USB adapter and interface adapter to the sensor as well as CSM-S for data recording.

The humidity sensors FA 400, FA 410, FA 415, FA 416 can be connected to the PC and the following adjustments can be carried out by means of the CS Service Software:

- Scaling of the 4...20 mA analogue output
- Selecting the units: % RH, °C_{td}, g/m³, mg/m³, ppm V/V
- Reading out of: Version no., production date, serial no., date of last calibration
- Adjustment of the alarm limits
- Single-point calibration (adjustment) - for this purpose a reference measuring instrument is required

By means of the CSM-S the measured data can be read out online at the PC. It can be stored and evaluated in graphic and in table form.

The right measuring chamber for each measuring task:

Standard measuring chamber for compressed air up to 16 bar
Order no. **0699 3390**

Measuring chamber for atmospheric dew point
Order no. **0699 3690**

High-pressure measuring chamber for compressed air up to 350 bar*
Order no. **0699 3590**

Measuring chamber for respiratory air bottles up to 350 bar*
Order no. **0699 3790**

Measuring chamber for granulate dryers
up to 250 mbar
Order no. **0699 3490**

* in case of pressures higher than 50 bar please order special version FA 400 / FA 410.

Mounting recommendation

The dew point meters can be mounted directly into the air stream.

However, we recommend always to use a screwable measuring chamber.

Screwable measuring chamber
Advantage: Easy installation via fast coupling

Calibration of **dew point sensors**

The calibration range for dew point sensors is -80...+20°C_{td}

It is possible to calibrate dew point sensors of CS Instruments as well as of other manufacturers.
High precision reference measuring instruments with DKD resp. BAM certificate grant an accuracy of up to 0.1 °C dew point.

Calibration range: from -80 to 20 °C_{td}

Accuracy of the DKD reference: 0.1 °C_{td}

Description	Order no.
Recalibration and precision calibration at -40 °Ctd including ISO certificate	0699 3333
Precision calibration in the range -80...20 °Ctd, °Ctd points freely selectable	0700 7710
Control and calibration set 11.3 % RH	0554 0002
Control and calibration set 33 % RH	0554 0004
Control and calibration set 75.3 % RH	0554 0005

Special feature

- Due to the digital data transfer only the dew point sensor has to be calibrated, enabling the display unit DS 300 to stay on-site at all times.

Control and calibration set

Control and calibration sets gurantee a defined humidity by means of a saturated saline solution.

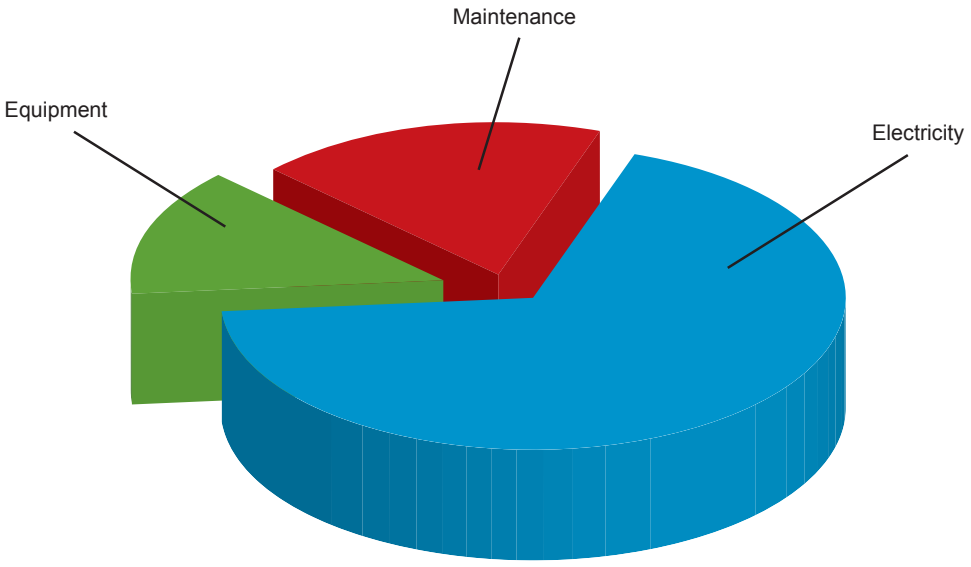
The control and calibration set is screwed onto the dew point sensor and therefore enables an easy and low-priced possibility for on-site control and calibration down to -20 °C dew point.

Consumption and **flow measurement**

Cost saving
In Germany 60,000 compressed air plants use 14,000,000,000 kWh electrical energy per year. 15 to 20% could be easily saved (Peter Radgen, Fraunhofer Institut, Karlsruhe). Most of these costs are caused by leakages in the compressed air system. The air "escapes" unused. **1 leak with a diameter of 1 mm causes costs of approximately 270 EUR/year**

The leak detector LD 300 (please see page 40) **will be payed off after 4 leakages**

Cost distribution in compressed air systems:



Example for a calculation of leakage costs at different pressures:

Leak Ø (mm)	Air loss at 6 bar (l/s)	Air loss at 12 bar (l/s)	Energy loss kWh at 6 bar	Energy loss kWh at 12 bar	Costs € p.a. at 6 bar	Costs € p.a. at 12 bar
1	1.2	1.8	0.3	1.0	144	480
3	11.1	20.8	3.1	12.7	1,488	6,96
5	30.9	58.5	8.3	33.7	3,984	16,176
10	123.8	235.2	33.0	132.0	15,840	63,360

Source: www.druckluft.effizient.de

VA 420

NEW

The affordable consumption counter for compressed air and gases

With and without flange

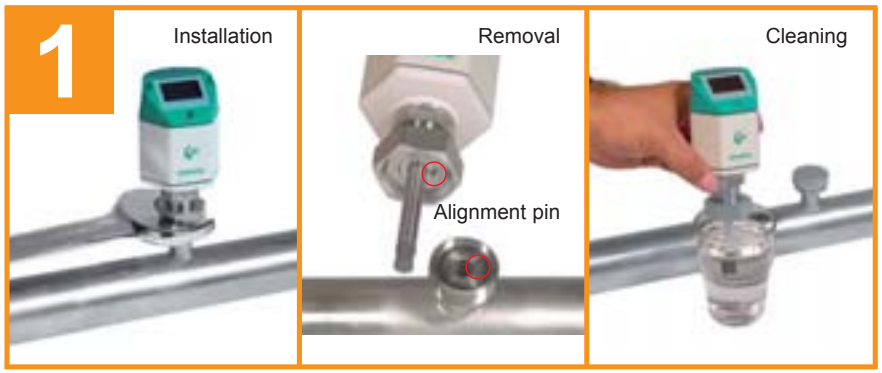
Intelligent solutions for accurate consumption measurement for compressed air and gases

The new affordable consumption counters VA 420 work according to the approved calorimetric measuring principle. In this process a heated sensor is cooled down by the gas circulating around it. The flow-dependent cooling-down is used as a measuring effect while the degree of cooling-down is directly depending on the passing air resp. gas mass. Therefore, an additional pressure and temperature compensation is not necessary.

Due to its compact design it is possible to monitor all compressed air systems from the compressor to the smallest compressed air tool (1/4" to 2 inch) with the new affordable consumption counter VA 420. VA 400 consumption sensors are available for larger pipe diameters from DN 50 to DN 300. Apart from compressed air also other gases like e. g. nitrogen, oxygen and CO_2 can be measured.

The installation of the compressed air counters VA 420 can be done easily and quickly. A special advantage is the removable measuring device. The measuring device can be demounted quickly and easily for calibration or cleaning purposes without removing the complete measuring section.

Removal of the measuring device without complete dismounting of the measuring section



In most cases the compressed air in not free from oil, condensate, dirt and particles. In the course of time this leads to a soiling of the compressed air counters which may cause errors in measurement or even a total breakdown.
The compressed air counters which have been on the market up to now generally cannot be cleaned and will be exchanged if they are soiled. In case of compressed air counters with integrated measuring section the "measuring device" cannot be removed. For this reason an expensive bypass line is necessary.

New. The design of **VA 420** enables the removal and cleaning of the "measuring device" with e. g. soap water without any dismounting of the measuring section.
A closing cap grants a continuous use of the line for the duration of the cleaning.
A bypass line is not necessary.
The alignment pin grants an accurate installation of the measuring device.

Stationary use

For stationary use there are the following outputs available for the data transfer to a building management system or PLC:
4…20 mA for actual consumption.
Pulse output (galvanically separated) for the total consumption.

Mobile use

By means of quick couplings the compressed air counter can be integrated quickly into the feed hose of a machine. During the shutdown of the machine it is possible to determine the leak rate, the actual consumption can be obtained when the machine is running. The power supply is effected via the power socket by means of the mains unit. For data recording over a longer period of time we recommend to use the compressed air analyzer DS 300 mobile.

Solution for large pipe diameters

The approved consumption sensor VA 400 is available for pipe diameters of 2" to DN 300. Its constructively sophisticated design enables the installation into pipes with nominal diameters up to DN 300 even under pressure. The installation is effected by means of a standard ½" ball valve.

VA 420 – The advantages at a glance

4…20 mA output for actual consumption

Pulse output for total consumption (counter reading)

Measuring device removable: Dismounting of the whole measuring section is not necessary, no bypass required.

Display twistable by 180°

Display shows 2 values:
Actual consumption in m³/h, l/min,…
Total consumption (counter reading) in m³, l

Values indicated in the display turnable by 180°, e. g. in case of overhead installation

Screw-in thread:
Easy installation into the existing pipeline due to integrated measuring section (suitable for 1/4", 1/2", 3/4", 1", 1 1/4", 1½" or 2" lines).

High measuring accuracy due to defined measuring section (inlet and outlet section).

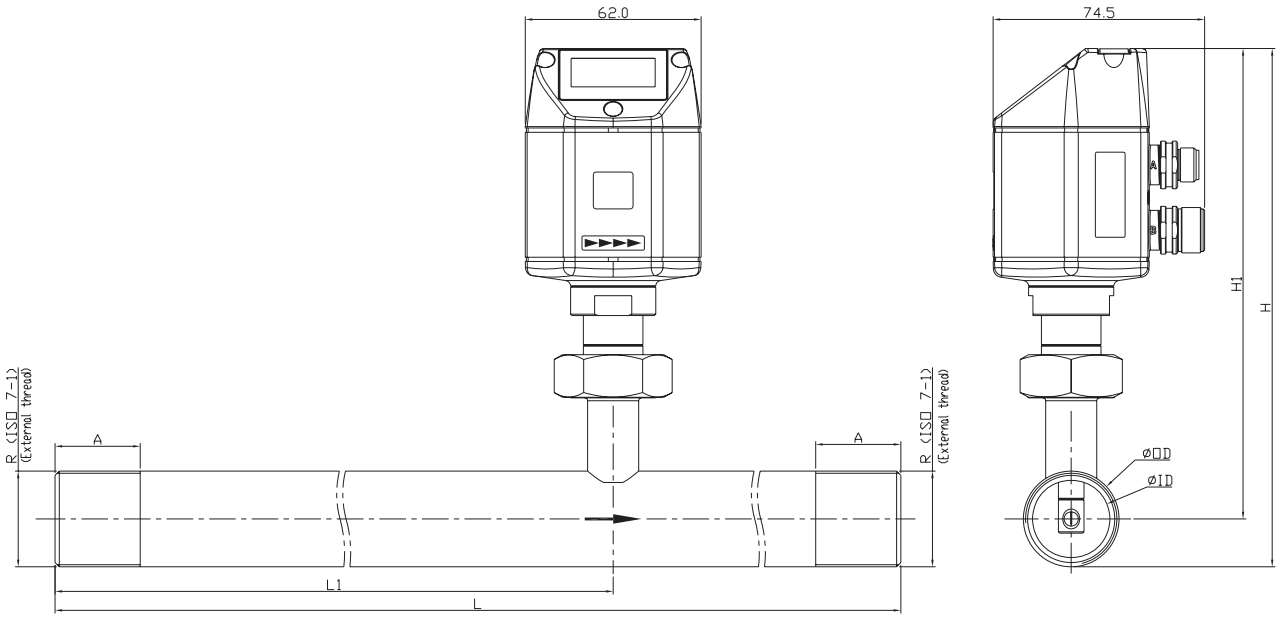
At the touch of a button:
– reset of counter reading
– selection of units

Application-technological features of the consumption counters VA 420:

- Easy and affordable installation
- Units freely selectable via keypad m³/h, m³/min, l/min, l/s, kg/h, kg/min, kg/s, cfm
- Compressed air counter up to 1,999,999,999 m³. Resettable to "zero" via keypad
- Analogue output 4...20 mA, pulse output (galvanically separated)
- High measuring accuracy also in the lower measuring range (ideal for leakage measurement)
- Negligibly small loss of pressure
- Calorimetric measuring principle, no additional pressure and temperature measurement necessary, no mechanically moved parts
- Gas types adjustable via software (nitrogen, oxygen, CO_2, nitrous oxide, argon)

Application range of VA 420:

- Compressed air balancing, compressed air consumption measurement
- Leakage air / leak rate determination
- Mobile compressed air measurement in front of single machines/plants
- Flow measurement of process gases like e. g. nitrogen, CO_2, oxygen, argon, nitrous oxide
- Flow measurement at nitrogen generators



Flow measuring ranges VA 420 for compressed air (ISO 1217: 1000 mbar, 20°C)

Connection thread	Outer pipe dia. mm	Inner pipe dia. mm	Measuring range from	to	L mm	L_1 mm	H mm	H_1 mm	A mm
R 1/4"	13.7	8.5	0.8	90 l/min	194	137	174.7	165.7	15
R 1/2"	21.3	16.1	0.2	90 m³/h	300	210	176.4	165.7	20
R 3/4"	26.9	21.7	0.3	170 m³/h	475	275	179.2	165.7	20
R 1"	33.7	27.3	0.5	290 m³/h	475	275	182.6	165.7	25
R 1 1/4"	42.4	36.8	0.7	480 m³/h	475	275	186.9	165.7	25
R 1 1/2"	48.3	41.8	1.0	550 m³/h	475*	275	189.9	165.7	25
R 2"	60.3	53.1	2.0	900 m³/h	475*	275	195.9	165.7	30

* Attention: Shortened inlet section! Please observe the recommended minimum inlet section (length = 10 x inner diameter) on site.

Description	Order no. Stainless steel 1.4404	Order no. Stainless steel 1.4301
VA 420 with integrated 1/4" measuring section	0695 1420	0695 0420
VA 420 with integrated 1/2" measuring section	0695 1421	0695 0421
VA 420 with integrated 3/4" measuring section	0695 1422	0695 0422
VA 420 with integrated 1" measuring section	0695 1423	0695 0423
VA 420 with integrated 1 1/4" measuring section	0695 1426	0695 0426
VA 420 with integrated 1 1/2" measuring section	0695 1424	0695 0424
VA 420 with integrated 2" measuring section	0695 1425	0695 0425
Option: High-pressure version PN 40		Z695 0411
Special measuring range VA 420 according to customer's requirements		Z695 4006
Connection cables:		
Connection cable 5 m (power supply, analogue output)		0553 0104
Connection cable 10 m (power supply, analogue output)		0553 0105
Pulse cable for consumption sensors with M12 plug, length 5 m		0553 0106
Pulse cable for consumption sensors with M12 plug, length 10 m		0553 0107
Further accessories:		
Closing cap for meas. section VA 420 (Material: Aluminium)		0190 0001
Closing cap for meas. section VA 420 (Material: Stainless steel 1.4404)		0190 0002
CS Service Software for FA/VA 400 sensors including PC connection set, USB interface and interface adapter to the sensor as well as CSM-S for data recording		0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24VDC, 0.35 A		0554 0108
Mains unit 100-240 VAC / 24 VDC, 0.35 A for VA/FA 400 Series, 2 m cable		0554 0107
5 point precision calibration with ISO certificate		3200 0001

Technical data VA 420

Parameters:	m³/h, l/min (1000 mbar, 20 °C) in case of com pressed air resp. Nm³/h, Nl/min (1013 mbar, 0 °C in case of gases
Adjustable via keypad:	m³/h, m³/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min
Meas. principle:	calorimetric measurement
Sensor:	2 x silicium chip
Meas. medium:	air, gases
Gas types adjustable via software:	air, nitrogen, argon, nitrous oxide, CO_2, oxygen
Meas. range:	see table at the left
Accuracy:	±1.5% of m.v., ±0.05% of f.s. On request: Special calibration via 5 point ISO calibration certificatet
Operating temp.:	-30...80 °C
Operating press.:	up to 16 bar Optional up to PN 40
Analogue output:	4...20 mA for m³/h resp. l/min
Pulse output:	1 pulse per m³ resp. per liter galvanically separated
PC connection:	SDI interface
Power supply:	24 VDC smoothed ± 15 %
Burden:	< 500 Ohm
Housing:	polycarbonate
Meas. section:	stainless steel, 1.4301 or 1.4404
Mounting thread meas. section:	R 1/4", R 1/2", R 3/4", R 1", R 1 1/4", R 1 1/2", R 2" external thread

VA 420 – The advantages at a glance

4…20 mA output for actual consumption

Pulse output for total consumption (counter reading)

Measuring device removable:
Dismounting of the whole measuring section is not necessary, no bypass required.

Display twistable by 180°

Display shows 2 values:
Actual consumption in m³/h, l/min,…
Total consumption (counter reading) in m³, l

Values indicated in the display turnable by 180°, e. g. in case of overhead installation

At the touch of a button:
– reset of counter reading
– selection of units

Easy installation into the existing pipeline due to integrated measuring section and weld neck flange (according to EN 1092-1 PN 40)

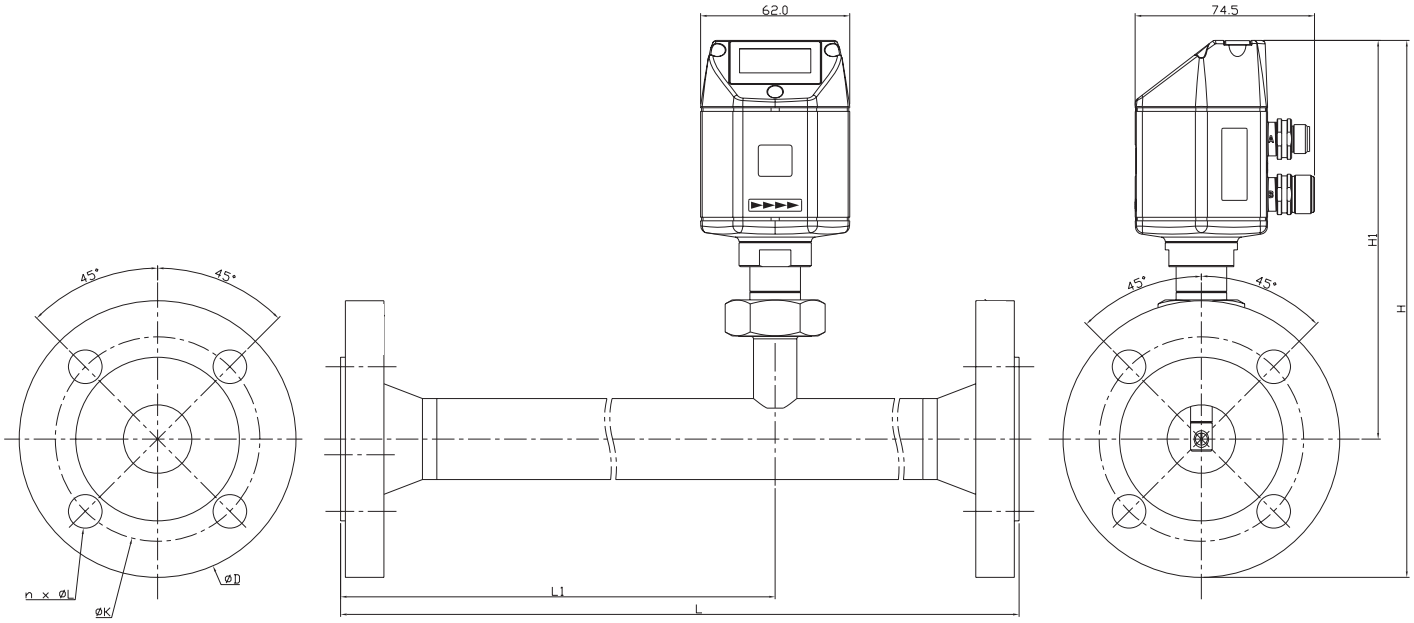
High measuring accuracy due to defined measuring section (inlet and outlet section).

Application-technological features of the consumption counters VA 420:

- Easy and affordable installation
- Units freely selectable via keypad m³/h, m³/min, l/min, l/s, kg/h, kg/min, kg/s, cfm
- Compressed air counter up to 1,999,999,999 m³. Resettable to "zero" via keypad
- Analogue output 4...20 mA, pulse output (galvanically separated)
- High measuring accuracy also in the lower measuring range (ideal for leakage measurement)
- Negligibly small loss of pressure
- Calorimetric measuring principle, no additional pressure and temperature measurement necessary, no mechanically moved parts
- Gas types adjustable via software (nitrogen, oxygen, CO_2, nitrous oxide, argon)

Application range of VA 420:

- Compressed air balancing, compressed air consumption measurement
- Leakage air / leak rate determination
- Flow measurement of process gases like e. g. nitrogen, CO_2, oxygen, argon, nitrous oxide
- Flow measurement at nitrogen generators



Flow measuring ranges VA 420 for compressed air (ISO 1217: 1000 mbar, 20°C)

Measur. section	Outer pipe dia. mm	Inner pipe dia. mm	Measuring range from	to	L mm	L_1 mm	H mm	H_1 mm	Flange DIN EN 1092-1 ØD	ØK	n x ØL
DN 15	21.3	16.1	0.2	90 m³/h	300	210	213.2	165.7	95	65	4 x 14
DN 20	26.9	21.7	0.3	170 m³/h	475	275	218.2	165.7	105	75	4 x 14
DN 25	33.7	27.3	0.5	290 m³/h	475	275	223.2	165.7	115	85	4 x 14
DN 32	42.4	36.8	0.7	480 m³/h	475	275	235.7	165.7	140	100	4 x 18
DN 40	48.3	41.8	1.0	550 m³/h	475*	275	240.7	165.7	150	110	4 x 18
DN 50	60.3	53.1	2.0	900 m³/h	475*	275	248.2	165.7	165	125	4 x 18

* Attention: Shortened inlet section! Please observe the recommended minimum inlet section (length = 10 x inner diameter) on site.

Description	Order no.
VA 420 with integrated DN 15 measuring section with weld neck flange	0695 2421
VA 420 with integrated DN 20 measuring section with weld neck flange	0695 2422
VA 420 with integrated DN 25 measuring section with weld neck flange	0695 2423
VA 420 with integrated DN 32 measuring section with weld neck flange	0695 2426
VA 420 with integrated DN 40 measuring section with weld neck flange	0695 2424
VA 420 with integrated DN 50 measuring section with weld neck flange	0695 2425
Option: High-pressure version PN 40	Z695 0411
Special measuring range VA 420 according to customer's requirements	Z695 4006
Connection cables:	
Connection cable 5 m (power supply, analogue output)	0553 0104
Connection cable 10 m (power supply, analogue output)	0553 0105
Pulse cable for consumption sensors with M12 plug, length 5 m	0553 0106
Pulse cable for consumption sensors with M12 plug, length 10 m	0553 0107
Further accessories:	
Closing cap for meas. section VA 420 (Material: Aluminium)	0190 0001
Closing cap for meas. section VA 420 (Material: Stainless steel 1.4404)	0190 0002
CS Service Software for FA/VA 400 sensors including PC connection set, USB interface and interface adapter to the sensor as well as CSM-S for data recording	0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24VDC, 0.35 A	0554 0108
Mains unit 100-240 VAC / 24 VDC, 0.35 A for VA/FA 400 Series, 2 m cable	0554 0107
5 point precision calibration with ISO certificate	3200 0001

Technical data VA 420

Parameters:	m³/h, l/min (1000 mbar, 20°C) in case of com pressed air resp. Nm³/h, Nl/min (1013 mbar, 0°C) in case of gases
Adjustable via keypad:	m³/h, m³/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min
Meas. principle:	calorimetric measurement
Sensor:	2 x silicium chip
Meas. medium:	air, gases
Gas types adjustable via software:	air, nitrogen, argon, nitrous oxide, CO_2, oxygen
Meas. range:	see table at the left
Accuracy:	±1.5% of m.v., ±0.05% of f.s. On request: Special calibration via 5 point ISO calibration certificatet
Operating temp.:	-30...80 °C
Operating press.:	up to 16 bar Optional up to PN 40
Analogue output:	4...20 mA for m³/h resp. l/min
Pulse output:	1 pulse per m³ resp. per liter galvanically separated
PC connection:	SDI interface
Power supply:	24 VDC smoothed ± 15 %
Burden:	< 500 Ohm
Meas. section:	stainless steel, 1.4404
Flanges:	Weld neck flange according to DIN EN 1092-1 Groove-faced and tongue-faced flange on request

Compressed air analyzer DS 300 mobile

Energy analysis – consumption measurement – leakage calculations at compressed air systems

The measuring instrument **DS 300 mobile enables the analysis of compressed air stations.** Up to 4 clamp-on ammeters measure the current consumption of every single compressor. Optionally also 4 pressure sensors, temperatrure sensors or any other analogue sensors can be connected.

In addition, the DS 300 mobile measures the discharged compressed air in m³/h, m³ and the dew point temperature in °Ctd at the same time.

The integrated data logger stores up to 1 million measured values.

The **CS analysis software** enables the graphical and statistical evaluation of the stored data at the PC.
From the stored current values it is possible to calculate the costs **in € for the energy consumption (kWh)** as well as the load and idle times of every single compressor including switch-on/switch-off cycles.

The costs per m³ and the total costs per year in € are calculated from the actually consumed quantity of compressed air.
A special leakage calculation determines the cost share of the leakages in comparison to the total costs in €.

For documentation of the measured values the user gets a DIN A 4 graphics printout for each compressor in a day view and in a week view at the touch of a button.

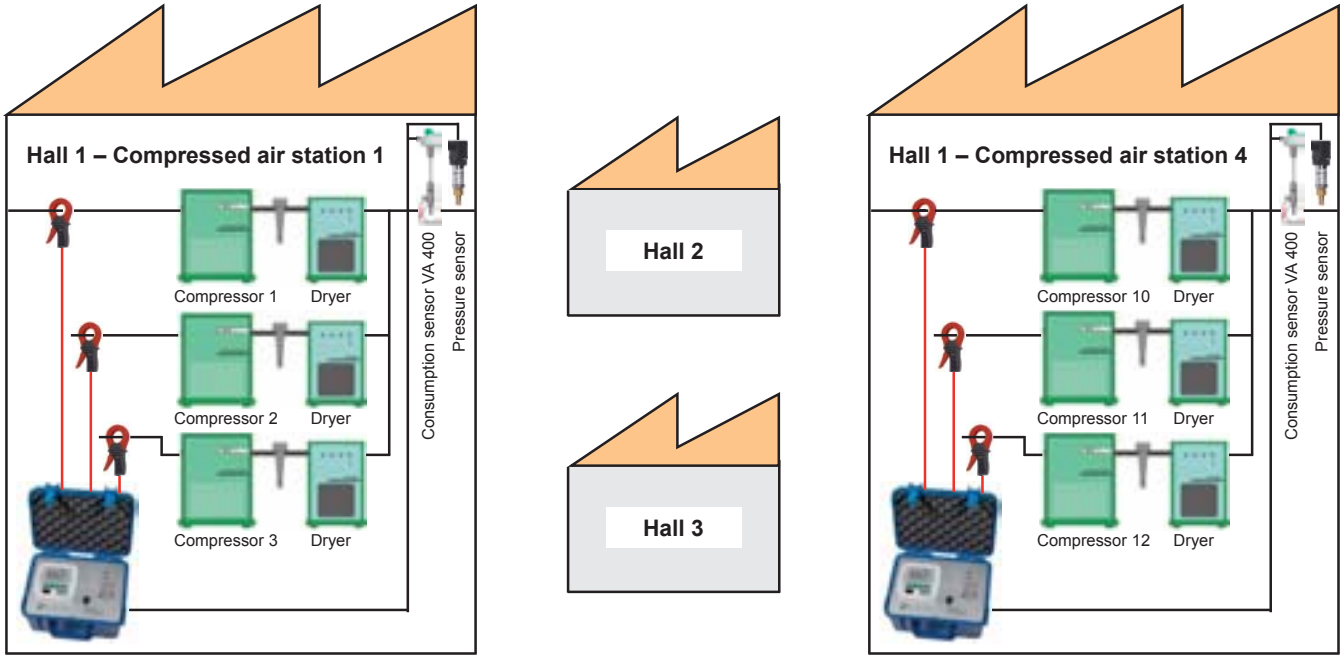
The additional printout with the statistical values contains all necessary data for a complete analysis of the compressor stations (see page 32).

Complex Excel® calculations and the issuing of reports are no longer necessary. Each service company can issue a report for the end customer with their own logo and additional information.

Step 1:
Current measurement of up to 12 compressors

A special advantage is that up to 12 compressors can be measured at the same time with 3 DS 300 mobile.

So compressed air stations which are often far away from each other can be measured separately and then summarized synchronously in one evaluation at the PC.



Step 2:
Analysis of the measured values at the PC

1 Compressor analysis (current measurement)

The energy consumption of every single compressor is measured by means of a clamp-on ammeter. The produced compressed air quantity is calculated by the software on the basis of the performance data of the compressor which have to be entered.
The following parameters are calculated additionally: Energy consumption in (kWh), load-, idle-, stop time, compressor load in %, number of loads/load removal (load cycles).

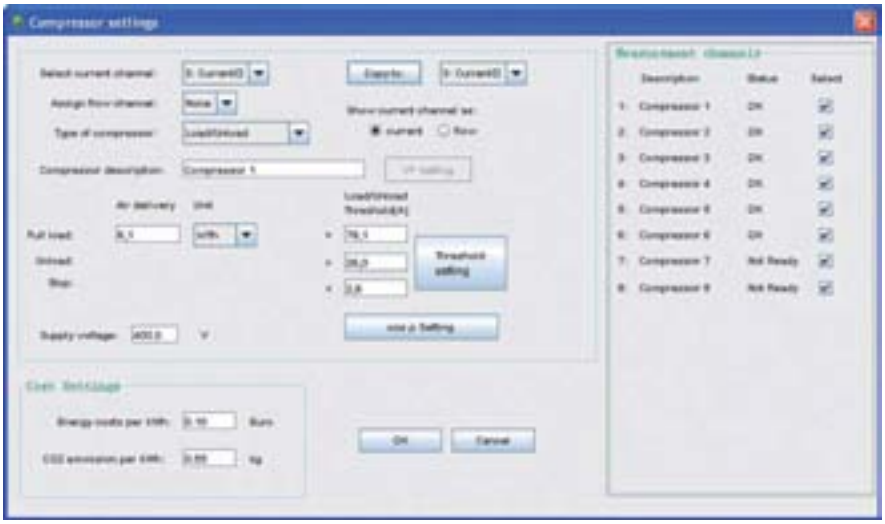
2 System analysis (current measurement and real consumption measurement)

The system analysis has the same function like the compressor analysis, however, it additionally offers the possibility to measure the actually produced resp. used quantity of compressed air by means of the consumption sensor VA 400.
With the additional "real consumption measurement" the leakages and therefore the cost share of the leakages in comparison to the total costs in € can be determined.

3 Leakage calculation

The leakage calculation is done during the production free time (shutdown, weekend, holidays). The consumption sensor VA 400 measures the supplied quantity of air. During the down time the compressor delivers compressed air in order to keep a constant pressure. According to statistics even if production is carried out day and night there is at least one short period of time during which all load is switched off. By means of this data the software defines a leakage rate and calculates the incurred leakage costs in €.

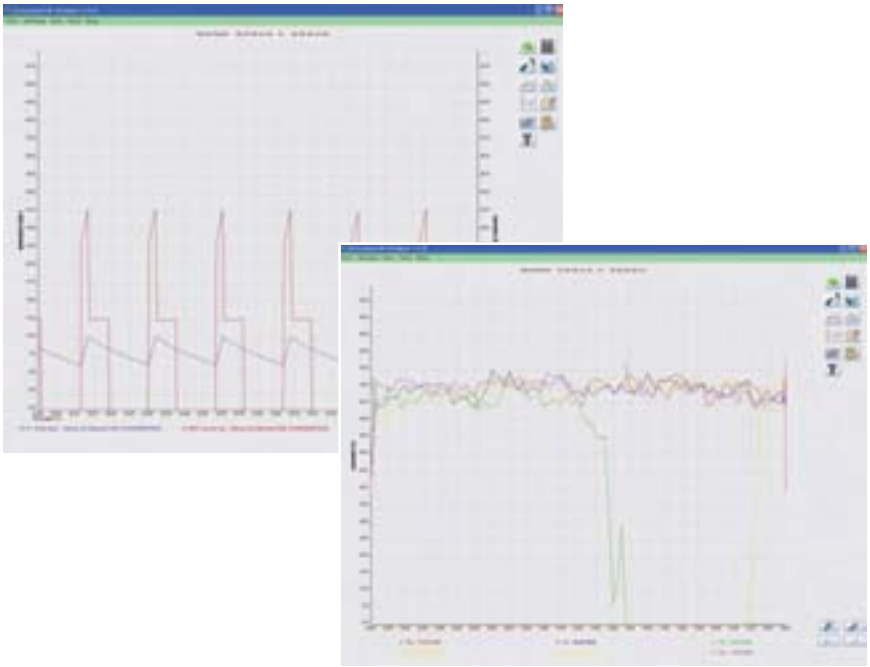
Step 3:
Evaluation at the PC with graphics and statistics



3.1 Entry of necessary parameters

Specific data have to be entered before the analysis is carried out:

- Selection of compressor type (load/idle resp. variable speed drive controlled)
- as well as entry of the performance data according to data sheet
- Period of measurement
- Costs in € for 1kWh



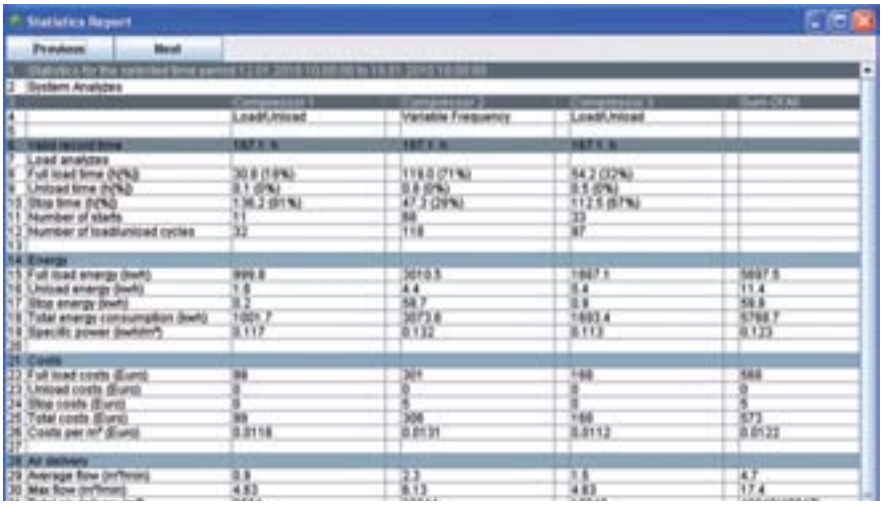
3.2 Graphic evaluation with day view and week view

Everything at a glance: The user gets a day and a week view of all stored measured data with his company logo (can be easily integrated) at the touch of a button.
By means of the zoom and the crosslines function peak values can be determined.

3.3 Compressed air costs in €

At the touch of a button the user gets all important data like e. g.

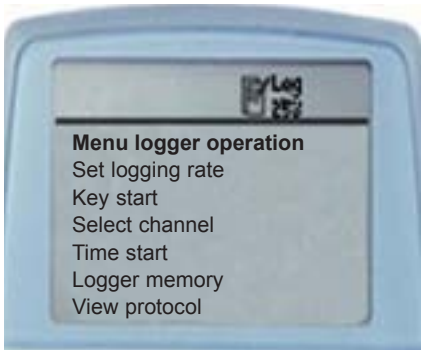
- Energy costs,
- Compressed air costs,
- Leakage costs in €,
- Compressor data with load/ idle times



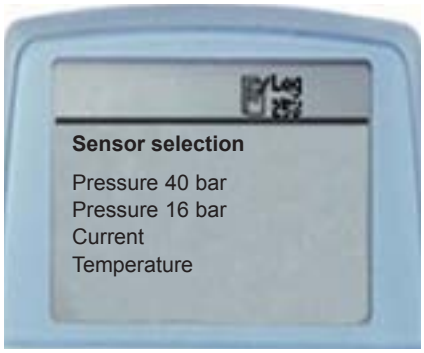
DS 300 mobile –
Easy operation without any instruction manual

The DS 300 mobile convinces due to its sophisticated operational concept which is similar to the self-explanatory operation of modern mobile phones.

By using the **<Enter>** key the user enters the menus, by using the **<Back>** key each step can be cancelled. Selection is done by the **<arrow up>** and **<arrow down>** key.
All important parameters can be adjusted on-site via the keypad.



In the menu "logger operation" e. g. the measuring rate (freely adjustable as of one second) and the start time are fixed.
Under **"view protocol"** the user gets the min-, max- and average values of the stored protocols. In the menu **"sensor selection"** the connectable sensors are selected.
So it can be decided on-site with which sensors the measurement should be carried out.



Description	Order no.
DS 300-P6 mobile, with data logger for 1 million measured values including 2 digital inputs and 4 analogue inputs in a robust case	0500 3226
DS 300-P4 mobile, with data logger for 1 million measured values including 2 digital inputs and 2 analogue inputs in a robust case	0500 3225
Consumption sensor VA 400 max. version (185 m/s) incl. certificate, 5 m cable	0695 0122
Option for VA 400: HighSpeed version (224 m/s)	Z695 4002
FA 410 dew point sensor from -80…20 °Ctd incl. mobile measuring chamber, 5 m cable	0699 0411
Precision pressure sensor CS 16 (0…16 bar)	0694 3555
Connection cable for pressure probe, 5 m, with ODU plug for DS 300 mobile	0553 0110
Clamp-on ammeter 0…1000 A TRMS, 5 m cable, incl. ODU plug	0554 0506
CS Analysis Software for leakage and cost calculation incl. CSM-S for data evaluation in graphic and table form	0599 2011
Case for all sensors (dimensions: 500 x 360 x 120 mm)	0554 6006
Further accessories:	
CSM-S for data evaluation in graphic and table form incl. USB interface	0554 7011
Extension cable 5 m for probes	0553 0103
Connection cable for third-party sensors (open ends), 5 m, with ODU plug for DS 300 mobile	0553 0110

Technical data DS 300 mobile:

- 2 digital inputs for FA 410 / VA 400 dew point and consumption
- 4 analogue inputs with DS 300-P6 resp. 2 analogue inputs with DS 300-P4 for connection of clamp-on ammeters, pressure sensors, temperature sensors
- Easy sensor recognition and selection
- USB interface
- 4 keys operation, self-explanatory
- 100-240 VAC, 50-60 Hz, add. internal rechargeable batteries for 4 hours operation time
- 0-50°C operation temperature
- -20...70°C transport temperature
- Data logger for 1 million meas. values
- Logging cycle freely adjustable from 1 second up to 1 hour
- Data logging at the touch of a button or with variable time start
- Housing dimensions: 280 x 230 x 155 mm
- Weight 2.3 kg

Technical data FA 410:

Measuring range:	-80…20 °Ctd
Accuracy:	± 1 °C at 20…-20 °Ctd ± 2 °C at -20…-50 °Ctd ± 3 °C at -50…-80 °Ctd
Pressure range:	-1…50 bar
Protection class:	IP 65
Operation temp.:	-20…70 °C
Screw-in thread:	G1/2"
Dimensions:	Ø 30 mm, Length: ca. 130 mm
Via DS 300 mobile: Select units:	% RH, °Ctd, g/m³, g/kg, mg/m³, ppm V/V

Technical data VA 400:

Parameters:	m³/h Standard, nach DIN 1945, ISO 1217 20 °C, 1000 mbar
Via DS 300 mobile selectable:	m³/h, m³/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min
Via DS 300 mobile selectable:	Diameter for volume flow calculation, counter resettable
Meas. principle:	Calorimetric measurement
Meas. medium:	Air, gases
Gas types selectable via instrument:	Air, nitrogen, argon, CO2, oxygen
Accuracy:	± 4 % m. v. ± 3 % m. v. via 5 point ISO precision calibration
Operation temp.:	-30…110 °C probe tube -30…80 °C housing
Operat. pressure:	Up to 50 bar
Probe tube:	Stainless steel, 1,4301 Mounting length 220 mm, Ø 10 mm
Mounting thread:	G1/2"
Diameter housing:	65 mm

What are the advantages of **the consumption measuring technology** of CS Instruments?

❶ Even under pressure, the consumption probe VA 400 is mounted by means of a standard 1/2" ball valve. During mounting and dismounting the safety ring avoids an uncontrolled ejection of the probe which may be caused by the operating pressure.

For the mounting into different pipe diameters VA 400 is available in the following probe lengths: 120, 160, 220, 300, 400 mm.

So the consumption probes are being mounted into existing pipelines with inner diameters of 1/2" upwards.

The exact positioning of the sensor in the middle of the pipe is granted by means of the engraved depth scale. The maximum mounting depth corresponds with the respective probe length. Example: VA 400 with probe length 220 mm has a maximum mounting depth of 220 mm.

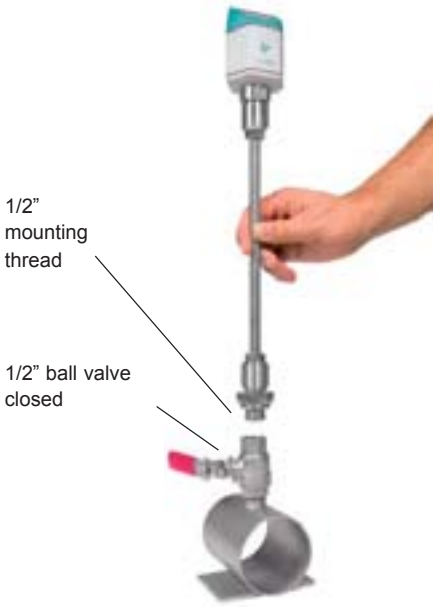
❷ If there is no suitable measuring site with a 1/2" ball valve present there are two simple possibilities to set up a measuring point:

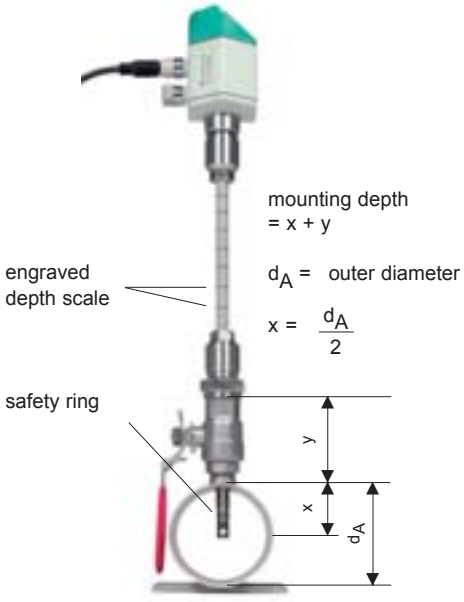
A Weld on a 1/2” screw neck and screw on a 1/2” ball valve.

B Mount spot drilling collar incl. ball valve (see accessories).

By means of the drilling jig it is possible to drill under pressure through the 1/2" ball valve into the existing pipeline. The drilling chips are collected in a filter. Then the probe can be mounted as described under point A.

❸ Due to the large measuring range of the probe even extreme requirements to the consumption measurement (high volume flow in small pipe diameters) can be met. The measuring range is depending on the pipe diameter - see table on the right hand side.





A Screw neck

B Spot drilling collar

Drilling under pressure

Flow measuring ranges VA 400 for compressed air (ISO 1217: 1000 mbar, 20°C)

Inner diameter of pipe			**VA 400 Standard** (92.7 m/s)	**VA 400 Max.** (185.0 m/s)	**VA 400 HighSpeed** (224.0 m/s)
Inch	mm		Meas. ranges from ... to	Meas. ranges from ... to	Meas. ranges from ... to
1/2”	16.1	DN 15	2.5...760 l/min	3.5...1516 l/min	6.0...1836 l/min
3/4”	21.7	DN 20	0.3...89 m^3/h	0.4...178 m^3/h	0.7...215 m^3/h
1”	27.3	DN 25	0.5...148 m^3/h	0.6...295 m^3/h	1.1...357 m^3/h
1 1/4”	36.0	DN 32	0.9...280 m^3/h	1.2...531 m^3/h	2.5...644 m^3/h
1 1/2”	41.8	DN 40	1.2...365 m^3/h	1.5...728 m^3/h	3.0...882 m^3/h
2”	53.1	DN 50	2...600 m^3/h	2.5...1198 m^3/h	4.6...1450 m^3/h
2 1/2”	71.1	DN 65	3.5...1096 m^3/h	5...2187 m^3/h	7...2648 m^3/h
3”	84.9	DN 80	5...1570 m^3/h	7...3133 m^3/h	12...3794 m^3/h
4”	110.0	DN 100	9...2645 m^3/h	12...5279 m^3/h	16...6391 m^3/h
5”	133.7	DN 125	13...3912 m^3/h	18...7808 m^3/h	24...9453 m^3/h
6”	159.3	DN 150	18...5560 m^3/h	25...11097 m^3h	43...13436 m^3/h
8”	200.0	DN 200	26...8786 m^3/h	33...17533 m^3/h	50...21230 m^3/h
10”	250.0	DN 250	40...13744 m^3h	52...27429 m^3/h	80...33211 m^3/h
12”	300.0	DN 300	60...19815 m^3/h	80...39544 m^3/h	100...47881 m^3/h

VA 400

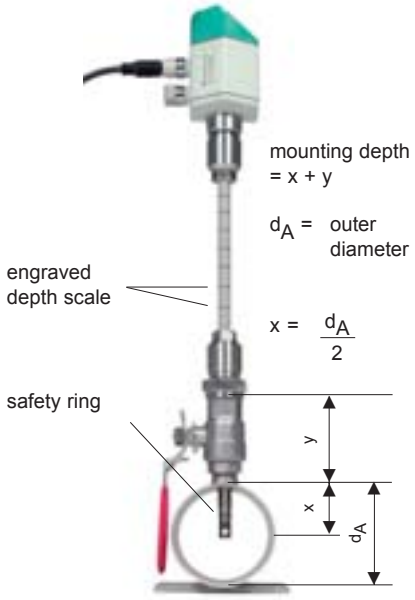
Consumption sensor for compressed air and gases

The new VA 400 for consumption measurement of compressed air and gases in a robust housing with and without display with actual consumption in m^3/h and counter in m^3.

Special features

- Integrated display for m^3/h und m^3
- Depth scale for accurate installation
- Usable from 1/2” to 12” (DN 300)
- Easy installation under pressure
- 4...20 mA analogue output for m^3/h resp. m^3/min
- Pulse output for m^3
- Inner diameter adjustable via keypad
- Consumption counter resettable

Inner diameter adjustable via keypad



Description	Order no.
VA 400 consumption sensor in basic version: Standard (92.7 m/s), probe length 220 mm, without display	0695 4001
Options for VA 400:	
Display	Z695 4000
Max. version (185 m/s)	Z695 4003
HighSpeed version (224 m/s)	Z695 4002
Probe length 120 mm	ZSL 0120
Probe length 160 mm	ZSL 0160
Probe length 300 mm	ZSL 0300
Probe length 400 mm	ZSL 0400
Connection cables:	
Connection cable, 5 m (power supply, analogue output, pulse output)	0553 0104
Connection cable, 10 m (power supply, analogue output, pulse output)	0553 0105
Additional accessories:	
CS Service Software for FA/VA 400 sensors incl. PC connection set, USB adapter and interface adapter to sensor as well as CSM-S for data recording	0554 2005
Mains unit in wall housing 100-240 V, 10 VA, 50-60 Hz/24 VDC, 0,35 A	0554 0108
External wall display multifunction measuring instrument DS 300	see page 36
5 point precision calibration with ISO certificate	3200 0001

Technical data VA 400

Parameters:	m³/h, l/min (1000 mbar, 20 °C) in case of com pressed air resp. Nm³/h, Nl/min (1013 mbar, 0 °C) in case of gases
Adjustable via software:	m^3/h, m^3/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min.
Adjustable via keypad:	diameter for volume flow calculation, counter resettable
Meas. principle:	calorimetric measurement
Sensor:	2 x silicium chip
Meas. medium:	air, gases
Gas types adjustable via software:	air, nitrogen, argon, helium, CO_2, oxygen
Meas. range:	see table page 34
Accuracy:	± 4 % m.v. ± 3 % m.v. via 5 point ISO precision calibration
Operating temp.:	-30...110 °C probe tube -30...80 °C housing
Operating pressure:	up to 50 bar
Analogue output:	4...20 mA for m^3/h resp. l/min; on request: scaling for cfm, m^3/min, l/min, l/s, ft/min, m/s
Pulse output:	1 pulse per m^3, signal high 24 VDC, for 30 ms
PC connection:	SDI interface
Power supply:	24 VDC
Burden:	< 500 Ohm
Housing:	polycarbonate
Probe tube:	stainless steel, 1,4301 mounting length 220 mm, Ø 10 mm
Mounting thread:	G1/2”
Diameter housing:	65 mm

Flow station DS 300

with consumption counter

DS 300 displays the actual value (m^3/h, m^3/min) and the total consumption. A 4...20 mA output for m^3/h and a pulse output for m^3 are available for routing to a superior building management system (PLC)

The large measuring range of the consumption sensors enable the recordings of high consumptions (e. g. on weekdays) and the determination of leakages of a few litres/min (e. g. weekends).

Special features

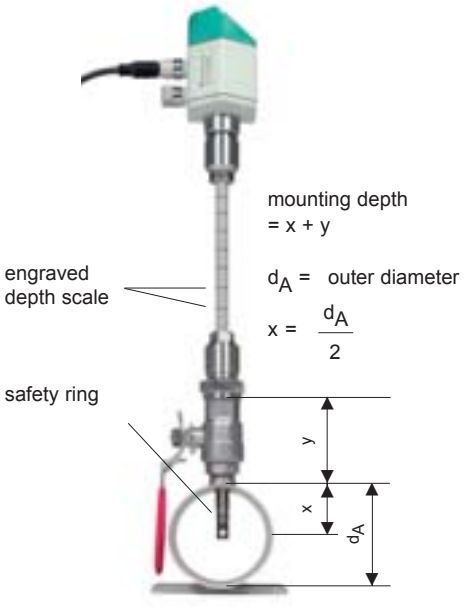
- Usable from 1/2” to 12” (DN 300)
- All-in-one solution, small installation expenditure
- 2 displays, actual flow and total consumption
- Easy installation and removal of the sensor under pressure
- Highest accuracy due to 5 point precision calibration
- Output 4 to 20 mA for m^3h, pulse output for m^3
- Easy handling:
  – Inner diameter freely adjustable in DS 300
  – 2 alarm values freely adjustable
  – Optical display in case of alarm
  – Consumption counter resettable
- Dew point sensor connectable

Flow station DS 300 with consumption counter consisting of:

- Multifunction measuring instrument DS 300
- Consumption probe VA 400
- Available with and without measuring section

Flow measuring ranges VA 400 for compressed air (ISO 1217: 1000 mbar, 20°C)

Inner diameter of pipe			**VA 400 Standard** (92.7 m/s)	**VA 400 Max.** (185.0 m/s)	**VA 400 HighSpeed** (224.0 m/s)
Inch	mm		Meas. ranges from ... to	Meas. ranges from ... to	Meas. ranges from ... to
1/2”	16.1	DN 15	2.5...760 l/min	3.5...1516 l/min	6.0...1836 l/min
3/4”	21.7	DN 20	0.3...89 m^3/h	0.4...178 m^3/h	0.7...215 m^3/h
1”	27.3	DN 25	0.5...148 m^3/h	0.6...295 m^3/h	1.1...357 m^3/h
1 1/4”	36.0	DN 32	0.9...280 m^3/h	1.2...531 m^3/h	2.5...644 m^3/h
1 1/2”	41.8	DN 40	1.2...365 m^3/h	1.5...728 m^3/h	3.0...882 m^3/h
2”	53.1	DN 50	2...600 m^3/h	2.5...1198 m^3/h	4.6...1450 m^3/h
2 1/2”	71.1	DN 65	3.5...1096 m^3/h	5...2187 m^3/h	7...2648 m^3/h
3”	84.9	DN 80	5...1570 m^3/h	7...3133 m^3/h	12...3794 m^3/h
4”	110.0	DN 100	9...2645 m^3/h	12...5279 m^3/h	16...6391 m^3/h
5”	133.7	DN 125	13...3912 m^3/h	18...7808 m^3/h	24...9453 m^3/h
6”	159.3	DN 150	18...5560 m^3/h	25...11097 m^3/h	43...13436 m^3/h
8”	200.0	DN 200	26...8786 m^3/h	33...17533 m^3/h	50...21230 m^3/h
10”	250.0	DN 250	40...13744 m^3/h	52...27429 m^3/h	80...33211 m^3/h
12”	300.0	DN 300	60...19815 m^3/h	80...39544 m^3/h	100...47881 m^3/h



Installation even under pressure via customary 1/2” ball valve

Option: Integrated data logger

- Automatic recording of the compressed air consumption
- Quantifying of leakages, compressed air consumption in production-free times, e. g. weekends
- Memory for 1 million measured values

Option: 2 additional sensor inputs

- For connection of pressure sensors, temperature sensors, clamp-on ammeters
  Sensors please see page 41

Description			Order no.
Flow station DS 300 for installation into existing pipelines (diamater freely adjustable at DS 300): Flow station DS 300 consisting of: Multifunction measuring instrument DS 300 and consumption probe VA 400 in basic version: Standard (92.7 m/s), probe length: 220 mm			0600 4005
Flow station DS 300 including measuring section (stainless steel) Flow station DS 300 consisting of: Multifunction measuring instrument DS 300 and consumption probe VA 400 in basic version: Standard (92.7 m/s), probe length: 220 mm incl. measuring section with ball valve made from stainless steel 1,4301; up to DN 65 (2 1/2") with external thread, from DN 80 (3") with flange according to DIN 2633			
External thread	**Pipe (outerø x wall thinkness)**	**Total length**	**Order no.**
G 1/2"	21.3 x 2.6 mm	500 mm	0601 0261
G 3/4"	26.9 x 2.6 mm	600 mm	0601 0262
G 1"	33.7 x 3.2 mm	750 mm	0601 0263
G 1 1/4"	42.4 x 3.2 mm	900 mm	0601 0264
G 1 1/2"	48.3 x 3.2 mm	1000 mm	0601 0265
G 2"	60.3 x 3.6 mm	1250 mm	0601 0266
G 2 1/2"	76.1 x 3.6 mm	1500 mm	0601 0267
From DN 80 with flange DIN 2633			
DN 80/88.9	88.9 x 2.0 mm	1850 mm	0601 0268
DN 100/114.3	114.3 x 2.0 mm	2104 mm	0601 0269
DN 125/139.7	139.7 x 3.0 mm	2860 mm	0601 0270
DN 150/168.3	168.3 x 3.0 mm	3110 mm	0601 0271
Options for multifunction measuring instrument DS 300			
Integrated data logger for 1 million measured values			Z500 3001
RS 485 interface for connection of up to 32 instruments DS 300			Z500 3002
2 additional sensor inputs for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4...20 mA, 0...10 V, Pt 100			Z500 3003
Ethernet interface			Z500 3005
Options for consumption probe VA 400			
Max. version (185 m/s)			Z695 4003
High Speed version (224 m/s)			Z695 4002
Probe length 120 mm			ZSL 0120
Probe length 160 mm			ZSL 0160
Probe length 300 mm			ZSL 0300
Probe length 400 mm			ZSL 0400
Accessory			
CSM-S for data evaluation in graphic and in table form including USB interface			0554 7011

Technical data VA 400

Parameters:	m^3/h Standard, acc. to DIN 1945, ISO 1217 20°C, 1000 mbar
Adjustable via DS 300:	m^3/h, m^3/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min
Meas. principle:	calorimetric measurement
Sensor:	2 x silicium chip
Meas. medium:	air, gas
Gas types select. via software:	air, nitrogen, argon, helium, CO2, oxygen
Meas. range:	see table page 34
Accuracy:	± 4 % m.v. ± 3 % m.v. via 5 point ISO precision calibration
Operating temp.:	-30...+110°C probe tube -30...+80°C housing
Operating press.:	up to 50 bar
Analogue output:	4...20 mA
Burden:	< 500 Ohm
Pulse output:	1 pulse per m^3
Probe tube:	stainless steel 1.4301
Mounting thread:	G 1/2"
Housing diameter:	65 mm

Technical data DS 300

Dimensions:	118 x 115 x 93 mm, IP 65 (wall housing) 92 x 92 x 70 mm, IP 65 (panel mounting)
Inputs:	2 digital inputs for VA 400 resp. FA 410
Interface:	USB
Keypad:	4 keys
Power supply:	100-240 VAC, 50-60 Hz
Accuracy:	see VA 400
Alarm outputs:	2 relays, 230 VAC, 3 A
Operating temp.:	0...50 °C
Transport temperature:	-20...70 °C
OPTIONS	
Data logger:	1 million meas. values start/stop time, meas. rate freely adjustable
RS 485 interface:	up to 32 x DS 300 connectable evaluation at the PC with CS Soft Network
2 additional sensor inputs:	for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4...20 mA, 0 bis 10 V, Pt100

VA 409
Flow direction switch for compressed air systems

The new thermal flow direction switch VA 409 with direction indication serves for determination of the flow direction of compressed air and gases especially in closed circular pipelines.

By means of VA 409 with flow direction indication the flow direction of the compressed air can be determined quickly and safely. Compared with the former mechanical paddle flow switches VA 409 is able to detect even the smallest changes in the flow direction quickly and without any mechanical movement.

The direction information in form of a potential-free contact (normally closed max. 60 VDC, 0.5 A) is transferred to the consumption sensors VA 400/VA 420 or to a separate building management system (mbs). Two LEDs show the flow direction.

In connection with 2 consumption sensors VA 400/VA 420 incoming and outflowing compressed air in closed circular pipelines can be measured precisely.

Special features

- detects smallest changes < 0.1 m/s referred to 20 °C and 1000 mbar
- no mechanical wear parts
- easy installation under pressure

Description	Order no.
Flow direction switch VA 409	0695 0409
Mains unit in wall housing	0554 0108
Connection cable VA/FA Series 400, 5 m with M12 plug	0553 0104
Connection cable VA/FA Series 400, 10 m with M12 plug	0553 0105

Technical data VA 409

Detection range recognition flow direction:	< 0.1 m/s referred to 20°C and 1000 mbar
Measuring principle:	calorimetric measurement
Sensor:	Pt 30/Pt 700/Pt 330
Measuring medium:	air, gases
Operating temp.:	0...50 °C probe tube -20...70 °C housing
Operating pressure:	up to 16 bar
Power supply:	24 VDC, 40 mA
Power input:	max. 80 mA up to 24 VDC
Protection class:	IP 54
EMV:	acc. to DIN EN 61326
Connection:	2 x M12, 5-pole, plug A and plug B
2 potential-free contacts:	2 x U max. 60 VDC, I max 0,5 A (normally closed); on request: Normally open
Housing:	polycarbonate
Probe tube:	stainless steel, 1,4301, length 160 mm, Ø 10 mm, safety ring Ø 11.5 mm, longer probes on request
Mounting thread:	G 1/2”
Diameter housing:	65 mm
Flow direction:	2 LEDs

Flow station DS 300
with direction indication in one direction

By connecting the flow direction switch VA 409 to the flow station DS 300 only the consumption in one direction is measured. So it is guaranteed that the back-flowing compressed air is not counted twice.

Special features

- precise consumption measurement in one direction
- when doing the cost calculation of the compressed air it is avoided that back-flowing compressed air is counted twice

Flow station DS 300
with flow direction indication in both directions

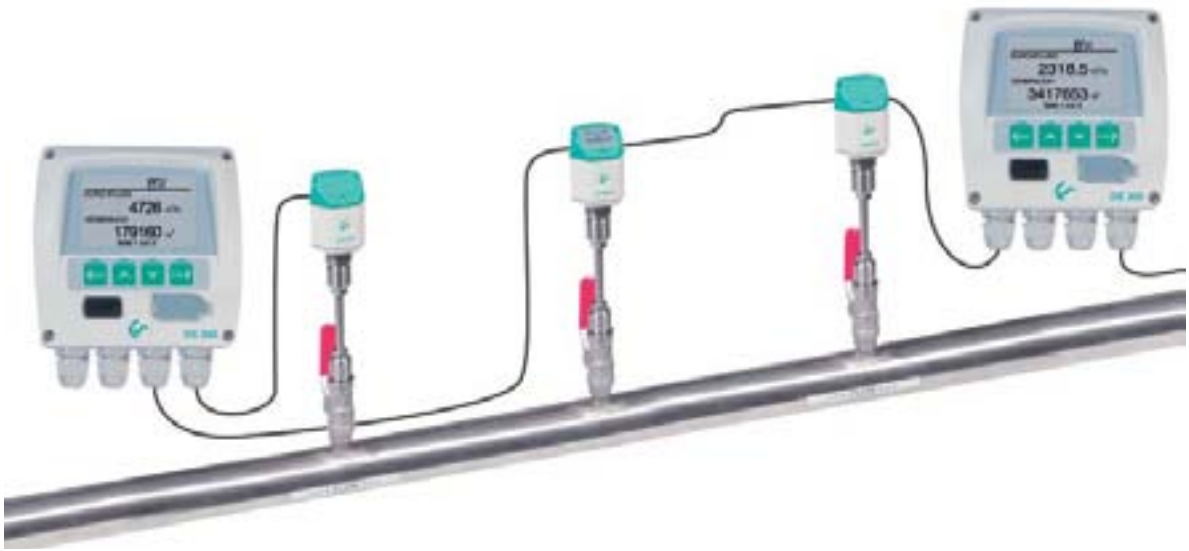
In case the flow direction switch VA 409 indicates the flow direction and forwards this information to the flow station DS 300.

Each of both flow stations DS 300 exclusively measures the flow in one direction. The flow direction switch VA 409 is mounted in the middle between both flow stations in order to avoid flow turbulences.

For this reason two flow stations DS 300 are used for precise consumption measurement of both flow directions.

Special features

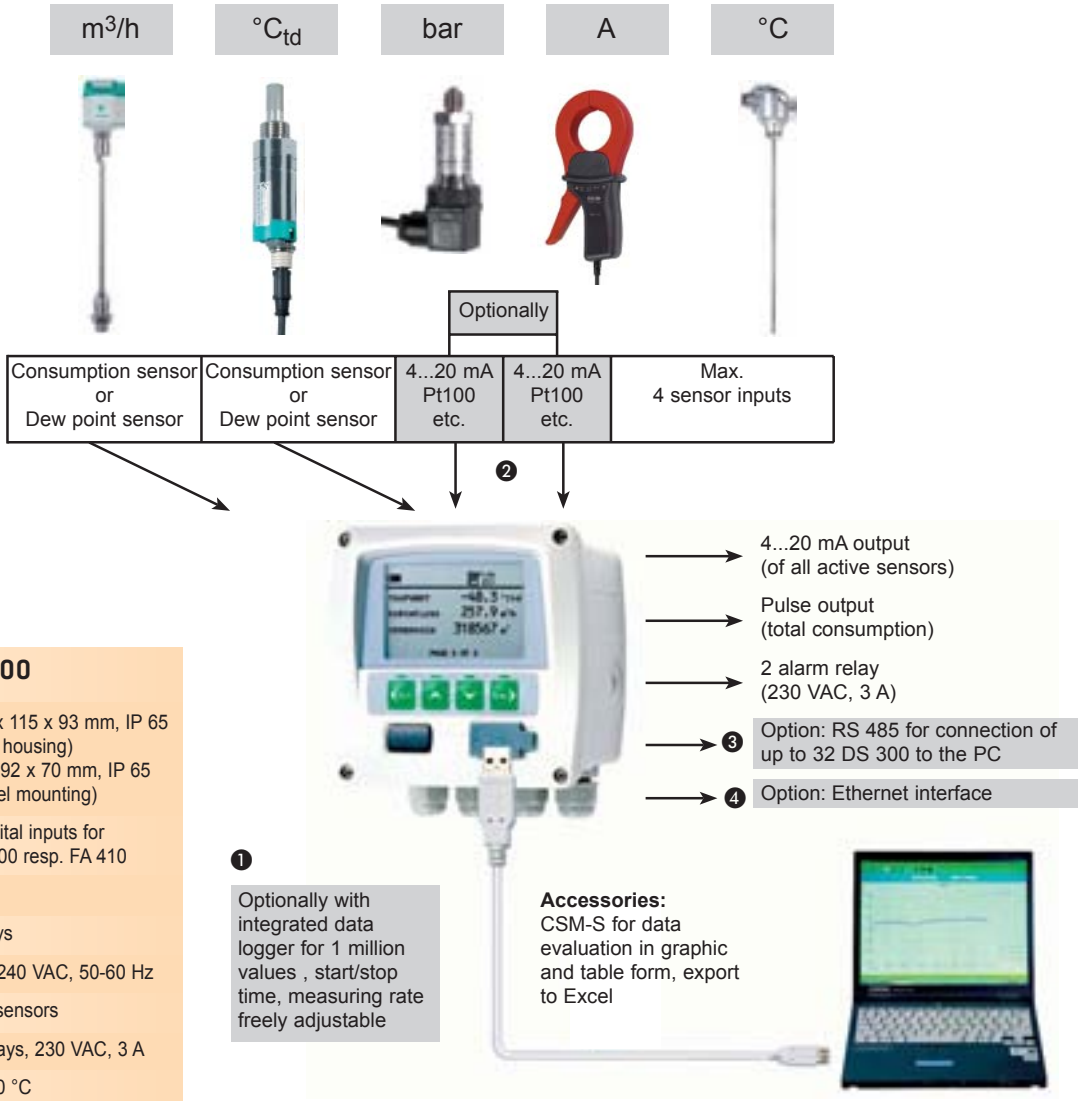
- precise consumption measurement in both directions
- separate indication of the actual consumption (m³/h resp. m³/min etc…) separate summing of the total consumption (m³ resp. l)
- forwarding of the analogue output and of the pulse output for the respective flow direction



Dew point Pressure Current Temperature

DS 300 multifunction measuring instrument

for all relevant parameters for compressed air


m³/h
°Ctd
bar
A
°C
Optionally
Consumption sensor or Dew point sensor
Consumption sensor or Dew point sensor
4...20 mA Pt100 etc.
4...20 mA Pt100 etc.
Max. 4 sensor inputs
❷
4...20 mA output (of all active sensors)
Pulse output (total consumption)
2 alarm relay (230 VAC, 3 A)
❸ Option: RS 485 for connection of up to 32 DS 300 to the PC
❹ Option: Ethernet interface
❶
Optionally with integrated data logger for 1 million values , start/stop time, measuring rate freely adjustable
Accessories:
CSM-S for data evaluation in graphic and table form, export to Excel

Technical data DS 300

Dimensions:	118 x 115 x 93 mm, IP 65 (wall housing) 92 x 92 x 70 mm, IP 65 (panel mounting)
Inputs:	2 digital inputs for VA 400 resp. FA 410
Interface:	USB
Keypad:	4 keys
Power supply:	100-240 VAC, 50-60 Hz
Accuracy:	see sensors
Alarm outputs:	2 relays, 230 VAC, 3 A
Operating temp.:	0...50 °C
Transport temperature:	-20...70 °C
OPTIONS	
Data logger:	1 million meas. values start/stop time, meas. rate freely adjustable
RS 485 interface:	up to 32 x DS 300 connectable, evaluation at the PC in graph. and table form by means of CS Soft Network
2 additional sensor inputs:	for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4...20 mA, 0 to 10 V, Pt100

Description	Order no.
DS 300 multifunction measuring instrument with 2 inputs for consumption and dew point sensors (without sensors)	0500 3000
Option ❶ Integrated data logger for 1 million measured values	Z500 3001
Option ❷ 2 additional sensor inputs for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors 0...10 V, Pt100	Z500 3003
Option ❸ RS 485 interface for connection of up to 32 DS 300 instruments	Z500 3002
Option ❹ Ethernet interface	Z500 3005
CSM-S for data evaluation in graphic and table form including USB cable	0554 7011
CS Soft Network - Database Client/Server Solution (up to 5 DS 300)	0554 7041

Dew point Pressure Current Temperature

DS 300 multifunction measuring instrument

Suitable probes at a glance

Description	Order no.
Consumption probes:	
VA 400 consumption probe in basic version: Standard (92.7 m/s), probe length 220 mm, without display	0695 4001
Options for VA 400:	
Max. version (185 m/s)	Z695 4003
HighSpeed version (224 m/s)	Z695 4002
Probe length 120 mm	ZSL 0120
Probe length 160 mm	ZSL 0160
Probe length 300 mm	ZSL 0300
Probe length 400 mm	ZSL 0400
Dew point sensors:	
FA 410 dew point sensor, -80°...20°Ctd including inspection certificate	0699 0410
FA 410 dew point sensor, -20°...50°Ctd including inspection certificate	0699 0412
Connection cables for VA 400, FA 410:	
Connection cable, length: 5 m, to DS 300	0553 0104
Connection cable, length: 10 m, to DS 300	0553 0105
Connection cable, length: 5 m, with ODU plug to DS 300 mobile version	0553 0111
Pressure sensors:	
Precision pressure sensor CS 16, 0...16 bar, ± 0.5 % accuracy of full scale	0694 3555
Precision pressure sensor CS 40, 0...40 bar, ± 0.5 % accuracy of full scale	0694 3930
Precision pressure sensor CS 1.6 absolute, 0...1.6 bar abs., ± 0.5 % accuracy of full scale	0694 3550
Precision pressure sensor CS -1...15 bar, ± 0.5 % accuracy of full scale	0694 3553
Standard pressure sensor CS 16, 0...16 bar, ± 1 % accuracy of full scale	0694 1886
Standard pressure sensor CS 40, 0...40 bar, ± 1 % accuracy of full scale	0694 0356
Standard pressure sensor CS 1.6 absolute, 0...1.6 bar abs., ± 1 % accuracy of full scale	0694 3551
Standard pressure sensor up to 100 bar / 250 bar / 400 bar	on request
Connection cables for pressure sensors:	
Connection cable, length: 5 m, to DS 300	0553 0108
Connection cable, length : 10 m, to DS 300	0553 0109
Connection cable, length: 5 m, with ODU plug to DS 300 mobile version	0553 0110
Temperature probes:	
Screw-in temperature probe Pt 100, Class A, length 300 mm, Ø 6 mm, with measuring transducer 4...20 mA = -50...+500 °C (2-wire technology)	0693 0002
Indoor/outdoor temperature probe Pt 100, Class A, -50...+100 °C	0604 0101
Indoor/outdoor temperature probe Pt 100, Class A with measuring transducer 4...20 mA = -50...+100 °C (2-wire technology)	0693 0001
Connection cables for temperature probes:	
Connection cable, length: 5 m, to DS 300	0553 0108
Connection cable, length: 10 m, to DS 300	0553 0109
Connection cable, length: 5 m, with ODU plug to DS 300 mobile version	0553 0110
Temperature probe cable Pt 100, Class A, length 300 mm, Ø 6 mm, -50...+180 °C, 5 m probe connection cable with open ends	0604 0102
Temperature probe cable Pt 100, Class A, length 150 mm, Ø 6 mm, -50...+180 °C, 5 m probe connection cable with open ends	0604 0100
Clamp screwing 6 mm, G 1/2", PTFE clamping ring, pressure-tight up to 6 bar	0554 6003
Clamp screwing 6 mm, G 1/2", VA clamping ring, pressure-tight up to 10 bar	0554 6004
Clamp-on ammeters:	
Clamp-on ammeter 0...1000 A TRMS incl. 5 m connection cable with open ends	0554 0507

• FA 410

• VA 400

• Pressure sensor

• Screw-in temperature probe

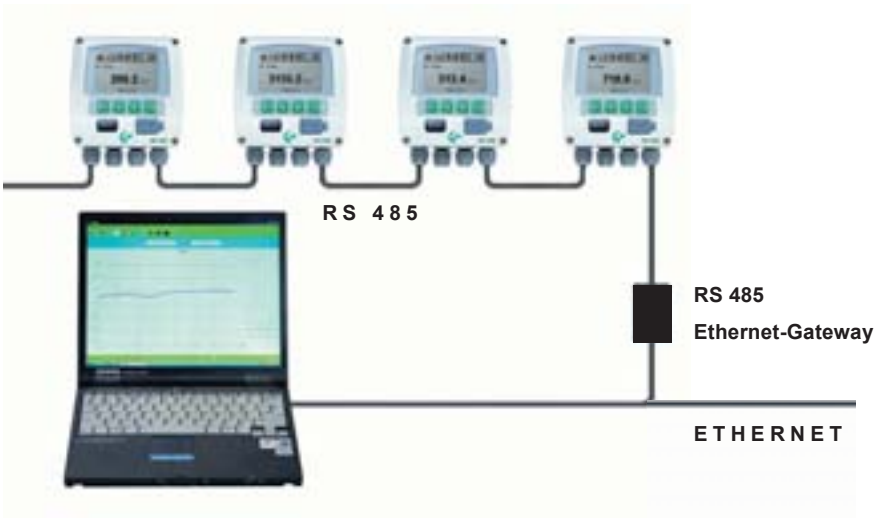
• Temperature probe cable

• Indoor/outdoor temperature probe

• Clamp-on ammeter

• Clamp screwing

DS 300 –
Connection to BUS systems



The following BUS systems can be realised:

- M-Bus
- Profibus DP Slave
- Modbus/RTU (RS 485)
- Modbus/RTU - Modbus/TCP (Ethernet)
- Modbus/RTU over TCP (Ethernet)
- Modbus/TCP (Ethernet)

Description	Order no.
Options for multifunction measuring instrument DS 300	
Integrated data logger for 1 million measured values	Z500 3001
RS 485 interface for connection of up to 32 DS 300 instruments	Z500 3002
Ethernet interface	Z500 3005
Accessories	
CS Soft Network - Database Client/Server Solution (up to 5 DS 300)	0554 7041

The right **housing** for each application

• Ethernet interface

• For panel mounting
Mounting dimensions: 92 x 92 x 70 mm

• For wall mounting

• Easy wall mounting

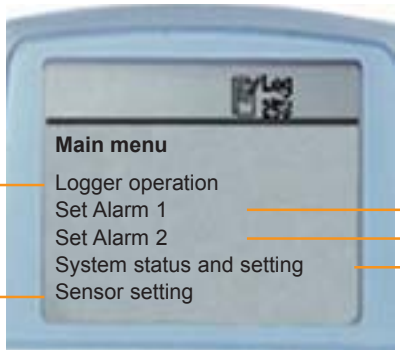
DS 300 –
sophisticated operational concept

DS 300 convinces due to its sophisticated operational concept which is similar to the self-explanatory operation of modern mobile phones.

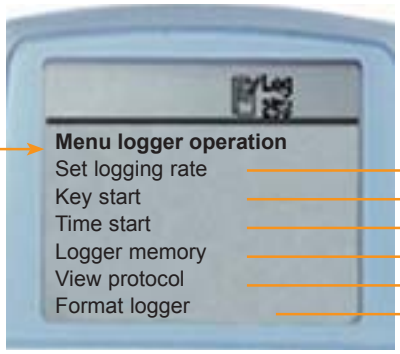
By using the **<Enter>** key the user enters the menus,

by using the **<Back>** key each step can be cancelled. Selection is done by the **<arrow up>** and **<arrow down>** key.

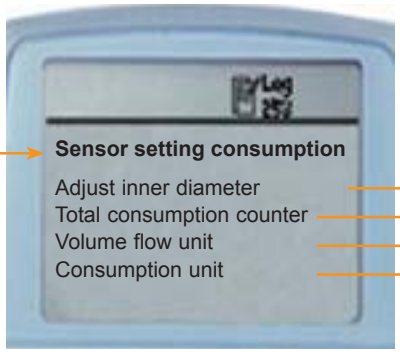
All important parameters can be set on-site via the keypad.



- Set Alarm 1 → Enter threshold value alarm relay 1 (not in case of DS 300 mobile version)
- Set Alarm 2 → Enter threshold value alarm relay 2 (not in case of DS 300 mobile version)
- System status and setting → Set date / time



- Set logging rate → The measuring rate can be freely adjusted between 1 second up to 59 minutes 59 seconds
- Key start → Logger starts at the push of a button / stops at the push of a button
- Time start → Logger starts at a defined date / time
- Logger memory → Shows the available recording time in hours, minutes
- View protocol → Retrieving of stored protocols with Min, Max, average values
- Format logger → Deletion of the whole memory content



- Adjust inner diameter → Inner diameter freely adjustable. Important for calculation in m^3/h
- Total consumption counter → Reset of total consumption counter to zero
- Volume flow unit → Volume flow unit freely selectable: m^3/h, m^3/min, l/min, l/s, cfm
- Consumption unit → Consumption unit: m^3, l, c

Useful **accessories:**
Measuring sections

• Measuring section 1/2”

• Measuring section 1/4”

Measuring sections for precise measurements

Meas. section made of stainless steel 1.4301 incl. ball valve, up to DN 65 (G2 1/2”) with external thread, from DN 80 with weld neck flange according to DIN 2633.

External thead	Pipe (outerø x wall thickness)	Total length	Order no.
G 1/4”	20.0 x 7.0 mm	180 mm	4000 0006
G 1/2”	21.3 x 2.6 mm	500 mm	4000 0015
G 3/4”	26.9 x 2.6 mm	600 mm	4000 0020
G 1”	33.7 x 3.2 mm	750 mm	4000 0025
G 1 1/4”	42.4 x 3.2 mm	900 mm	4000 0032
G 1 1/2”	48.3 x 3.2 mm	1000 mm	4000 0040
G 2”	60.3 x 3.6 mm	1250 mm	4000 0050
G 2 1/2”	76.1 x 3.6 mm	1500 mm	4000 0065
from DN 80 with flange DIN 2633			
DN 80/88.9	88.9 x 2.0 mm	1850 mm	4000 0080
DN 100/114.3	114.3 x 2.0 mm	2104 mm	4000 0100
DN 125/139.7	139.7 x 3.0 mm	2860 mm	4000 0125
DN 150/168,3	168,3 x 3,0 mm	3110 mm	4000 0150

Drilling jig for drilling under pressure

By means of a special drilling device a measuring site with 1/2" ball valve can be easily set up within a few minutes.
As an alternative to the welding of the 1/2” fitting also a spot drilling collar (see page 45) can be used.

• Drilling jig

• High-pressure protection

• Drilling under pressure

Description	Order no.
Drilling jig incl. drill (Ø 13 mm)	0530 1108
High-pressure protection recommended for installation from 10 to 50 bar	0530 1105

Useful **accessories:**
Spot drilling collars

If there is no measuring site with 1/2" ball valve present it can be set up by means of spot drilling collars.
The spot drilling collar is imposed onto the pipe and tightened via thread rods. The enveloping rubber gasket is pressure-tight up to 10 bar. By means of the drilling jig (page 44) it is possible to drill through the 1/2" ball valve into the existing pipe.
Important: Please indicate the exact outer diameter of the existing pipe when placing the order resp. please select the suitable spot drilling collar from the adjoining list.

• Spot drilling collar

Description DN		Order no.
Spot drilling collar for pipe Ø 026 - 030 mm, Length: 100 mm,*		0500 0447
Spot drilling collar for pipe Ø 032 - 036 mm, Length: 100 mm,*		0500 0446
Spot drilling collar for pipe Ø 036 - 040 mm, Length: 100 mm,*		0500 0448
Spot drilling collar for pipe Ø 040 - 044 mm, Length: 150 mm,*		0500 0449
Spot drilling collar for pipe Ø 044 - 051 mm, Length: 200 mm,*		0500 0610
Spot drilling collar for pipe Ø 048 - 055 mm, Length: 200 mm,*	40	0500 0611
Spot drilling collar for pipe Ø 052 - 059 mm, Length: 200 mm,*		0500 0612
Spot drilling collar for pipe Ø 057 - 064 mm, Length: 200 mm,*	50	0500 0613
Spot drilling collar for pipe Ø 063 - 070 mm, Length: 200 mm,*		0500 0614
Spot drilling collar for pipe Ø 070 - 077 mm, Length: 200 mm,*	65	0500 0615
Spot drilling collar for pipe Ø 075 - 083 mm, Length: 200 mm,*		0500 0616
Spot drilling collar for pipe Ø 082 - 090 mm, Length: 200 mm,*		0500 0617
Spot drilling collar for pipe Ø 087 - 097 mm, Length: 200 mm,*	80	0500 0618
Spot drilling collar for pipe Ø 095 - 104 mm, Length: 200 mm,*		0500 0619
Spot drilling collar for pipe Ø 102 - 112 mm, Length: 200 mm,*		0500 0620
Spot drilling collar for pipe Ø 108 - 118 mm, Length: 200 mm,*	100	0500 0621
Spot drilling collar for pipe Ø 118 - 128 mm, Length: 200 mm,*		0500 0622
Spot drilling collar for pipe Ø 125 - 135 mm, Length: 200 mm,*		0500 0623
Spot drilling collar for pipe Ø 133 - 144 mm, Length: 200 mm,*	125	0500 0624
Spot drilling collar for pipe Ø 145 - 155 mm, Length: 250 mm,*		0500 0625
Spot drilling collar for pipe Ø 151 - 161 mm, Length: 250 mm,*	150	0500 0626
Spot drilling collar for pipe Ø 159 - 170 mm, Length: 250 mm,*		0500 0627
Spot drilling collar for pipe Ø 168 - 180 mm, Length: 250 mm,*		0500 0628
Spot drilling collar for pipe Ø 180 - 191 mm, Length: 250 mm,*	175	0500 0629
Spot drilling collar for pipe Ø 193 - 203 mm, Length: 300 mm,*		0500 0630
Spot drilling collar for pipe Ø 200 - 210 mm, Length: 300 mm,*		0500 0631
Spot drilling collar for pipe Ø 209 - 220 mm, Length: 300 mm,*	200	0500 0632

* incl. 1/2" ball valve

Thickness meter
CS 0495

The entry of the correct inner diameter is essential for an accurate consumption measurement.

The thickness meter CS 0495 enables a quick, easy and accurate measurement of the wall thickness of pipes. So the determination of the inner diameter becomes very easy.

Description	Order no.
Thickness meter CS 0495 including case and calibration block	0560 0495

Technical data CS 0495	
Meas. range:	1.5…200 mm, 0.06…8 Inch
Meas. prinicple:	ultrasonic
Measured materials:	steel, cast iron, aluminium, copper, brass, zinc, quartz glass, polyethylene, PVC, grey iron, nodular cast iron
Calibration block:	included in shipment
Resolution:	0.1 mm
Accuracy:	± (0.5 % n+0.1)
Power supply:	4 x 1.5 V AA (UM-3) batteries
Dimensions:	160 x 68 x 32 mm
Weight:	208 g

Calibration of **consumption sensors** and **flow stations**

In the CS calibration laboratory for consumption sensors it is possible to calibrate consumption measuring instruments of CS Instruments as well as of other manufacturers.
High precision reference measuring instruments grant an accuracy of up 0.5 % of the measured value.

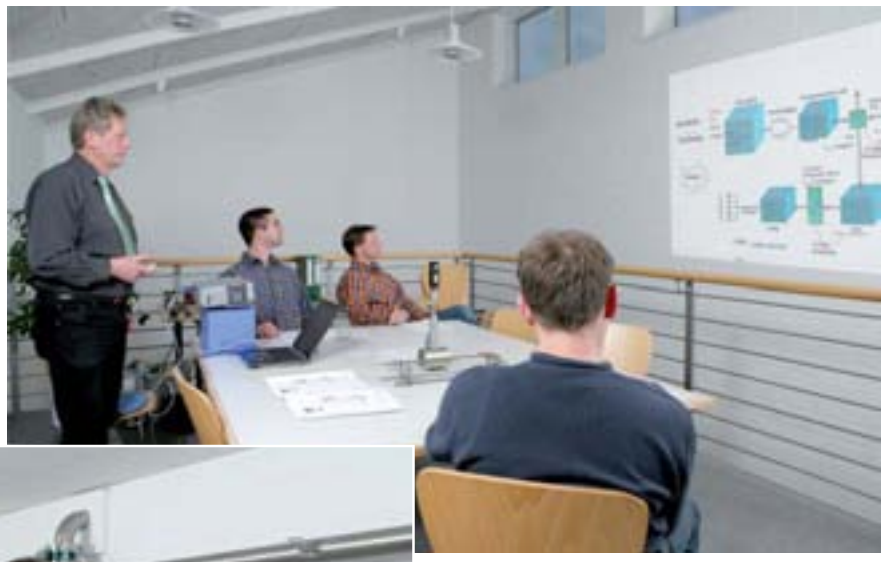
Special feature

- Due to digital data transfer only the consumption sensor has to be calibrated, enabling the display unit DS 300 to stay on-site at all times.

Calibration range:	from 0 to 4,000 m^3/h under pressure
Accuracy of the reference:	between 0.5 and 1 % of the meas. value

Description	Order no.
Recalibration and 5 point precision calibration of flow sensor with ISO certificate	0695 3333
Volume flow, freely selectable measuring points	on request
Real gas calibration	3200 0015

Compressed air analysis seminar:
m^3/h, °C_{td}, °C, A, bar…



Basics in theory for humidity and consumption measurement

Practical measurements and evaluation of the measuring results

Hands-on seminar on compressed air analysis:

- Compressed air quality according to ISO 8573
- Practical applications: Which compressed air quality is needed?
- Methods of compressed air drying and compressed air processing
- Moisture measurement in compressed air
- Costs of compressed air consumption
- Consumption measurement

Target groups / participants

- Quality assurances employees
- Application planners
- Measurement and control technicians
- Maintenance employees

LD 300 leak detector

If gases escape through leaks ultrasonic noises are generated. By means of the LD 300 leakages can be detected in the ultrasonic range even from distances of several meters. LD 300 transforms the inaudible signals into a frequency which can be identified by means of the provided sound-proof headset. In depressurized systems an ultrasonic tone generator can be used of which the signal travels through smallest openings.

Sound-proof headset enables leak detection in extremely noisy environments

Focus tube with focus tip avoids influence by ambient noise and enables precise locating of leakages

Holding device of LD 300 at the telescope bar

The **telescope bar helps** locating leakages in pipelines up to a height of 6 m

Annual energy costs caused by leakages

Hole	**Loss in air**		**Energy loss**		**Costs p.a.**	
Ø	at 6 bar	at 12 bar	at 6 bar	at 12 bar	at 6 bar	at 12 bar
(mm)	(l/s)	(l/s)	kW/h	kW/h	€	€
1	1.2	1.8	0.3	1.0	144	480
3	11.1	20.8	3.1	12.7	1.488	6.096
5	30.9	58.5	8.3	33.7	3.984	16.176
10	123.8	235.2	33.0	132.0	15.840	63.360

Source: www.druckluft.effizient.de (*) kW x 0.06 € x 8.000 Bh/a

Applications:

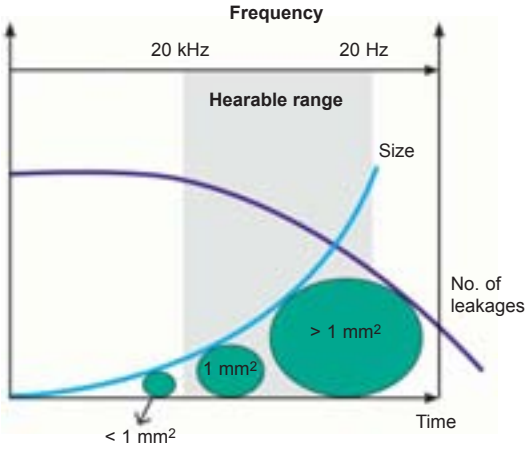
Leak detection in:

- Compressed air lines, gas, vapour and vacuum plants
- Refrigerating plants
- Door seals

LD 300 leak detector

Cost saving

In Germany 60,000 compressed air plants use 14,000,000,000 kWh electrical energy per year. 15 to 20 % could be easily saved (Peter Radgen, Fraunhofer Institut, Karlsruhe). Most of theses costs are caused by leakages in the compressed air system. The air "escapes" unused. **1 leak with a diameter of 1 mm = 270 EUR/year. The LD 300 will be payed off after 4 leakages.**



- hole size increases over time
- the human ear can only hear leakages which are bigger than 1 mm² at 7 bar
- until they are noticed 10 small leaks may cause a loss of 7,000 Euro/year

The integrated laser facilitates the detection of leaks.

Description	Order no.
Set LD 300 leak detector consisting of:	**0601 0103**
LD 300 leak detector	0560 0102
Ultrasonic sensor	0605 0001
Sound-proof headset	0554 0102
Focus tube with focus tip	0530 0101
Cable for ultrasonic sensor	0553 0101
Battery charger	0554 0001
Transport case	0554 0101
Accessories, not included in the set:	
Ultrasonic tone generator	0554 0103
Telescope bar 3 x 120 cm	0530 0102

Technical data LD 300

Working frequency:	40 kHz ± 2 kHz
Connections:	1) 4-pole connection for headset and battery charger 2) 3.5 mm stereo socket for sensor and cable connection
Laser:	wave length: 655...660 nm output power: 0.4...0.5 mW
Power supply:	internal NiMH rech. battery
Operating duration:	approx. 6 hours without laser, approx. 4 hours with laser
Charging time:	approx. 1.5 hours
Operating temp.:	0 to 40 °C
Storage temp.:	-10 to 50 °C
Telescope:	3 x 120 cm

DS 52 – digital process meter

in wall housing for 0 (4)...20 mA signals

With the new digital process meter DS 52 in a shapely wall housing the annoying search and the mounting into a suitable plastic housing is no longer necessary. DS 52 disposes of 2 potential-free alarm contacts (switch-over contacts) which can be charged with maximum 230 VAC, 3 A. The alarm limits can be adjusted via the keys.
The diplay is supplied with 230 VAC and disposes of an internal mains unit which provides a voltage of 24 VDC/100 mA for the sensor. Free screwing clamps are available for forwarding the (0)4...20 mA signal to superordinated systems.

Special features:

- Integrated in a shapely wall housing
- Suitable for all customary sensors with 0(4)...20 mA signal
- Easy operation
- 2 relay outputs (230 VAC, 3 A)

Example of use:
Pressure monitoring with optional alarm unit (buzzer + continuous light)

Example of use:
Temperature monitoring with alarm

Technical data DS 52

Dimensions:	118 x 133 x 92 mm (WxHxD)
Display:	LED, 5 digits, height 13 mm, 2 LED for alarm
Keypad:	4 keys: Enter, Back, Up, Down
Sensor input:	For sensors with 0(4)...20 mA signal. Connectable in 2-/3-/4-wire technology
Accuracy:	max. +/- 20 µA, typical +/- 10 µA
Burden:	100 Ohm
Sensor supply:	24 VDC, max. 100 mA
Volate supply: (option)	230 VAC, 50/60 Hz or 24 V DC or 110 VAC
Outputs:	2 x relay output, changeover contact, 250 VAC, max. 3 A
Alarm limits:	Freely adjustable via keypad
Hysteresis:	Freely adjustable via keypad
Operation temp.:	-10...+60°C (storage temp.: -20...+80°C)
Operation menu:	Lockable by code against third-party access

Description	Order no.
DS 52 – digital process meter in wall housing, supply 230 VAC, sensor input for 0(4)...20 mA signal, 2 alarm relays	0500 0008
Options:	
Supply 24 VDC instead of 230 VAC	Z500 0001
Supply 110 VAC instead 230 VAC	Z500 0002
Alarm unit mounted at wall housing	Z500 0003
Alarm unit for external mounting	Z500 0004
All-in one sets:	
DS 52 – all-in one set for pressure monitoring /alerting, consisting of DS 52 LED display and pressure sensor 0...16 bar	on request
DS 52 – all-in one set for temperature monitoring /alerting, consisting of DS 52 LED display and screw-in temperature probe -50...+500°C	on request

DS 51 – digital panel meter

for 0 (4)...20 mA signals

The DS 51 digital panel meter disposes of 2 potential-free alarm contacts (change- over adjusted via the keys. The digital panel meter is supplied with 230 VAC and disposes of an internal mains unit which provides the voltage supply of 24 VDC/100 mA for the sensor.

Special features:

- Suitable for all customary sensors with 0(4)...20 mA signal
- Easy operation
- 2 relay outputs (230 VAC, 3 A)

Description	Order no.
DS 51 – digital meter for panel mounting, supply 230 VAC, sensor input for 0(4)...20 mA signal, 2 alarm relays	0500 0006
Options:	
Supply 24 VDC instead of 230 VAC	Z500 0001
Supply 110 VAC instead of 230 VAC	Z500 0002

Technical data DS 51

Dimensions:	96 x 48 mm (WxH) Mounting depth: 95 mm
Display:	LED, 5 digits, height 13 mm, 2 LED for alarm
Keypad:	3 keys: Set, Up, Down
Sensor input:	For sensors with 0(4)...20 mA signal. Connectable in 2-/3-/4-wire technology
Accuracy:	max. +/- 20 µA, typical +/- 10 µA
Burden:	100 Ohm
Sensor supply:	24 VDC, max. 100 mA
Voltage supply: (option)	230 VAC, 50/60 Hz or 24 V DC or 110 VAC
Outputs:	2 x relay output, changeover contact, 250 VAC, max. 3 A
Alarm values:	Freely adjustable via keypad
Hysteresis	Freely adjustable via keypad
Operation temp.:	-10...+60°C (storage temp.: -20...+80°C)
Operation menu:	Lockable by code against third-party access

Notes:

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